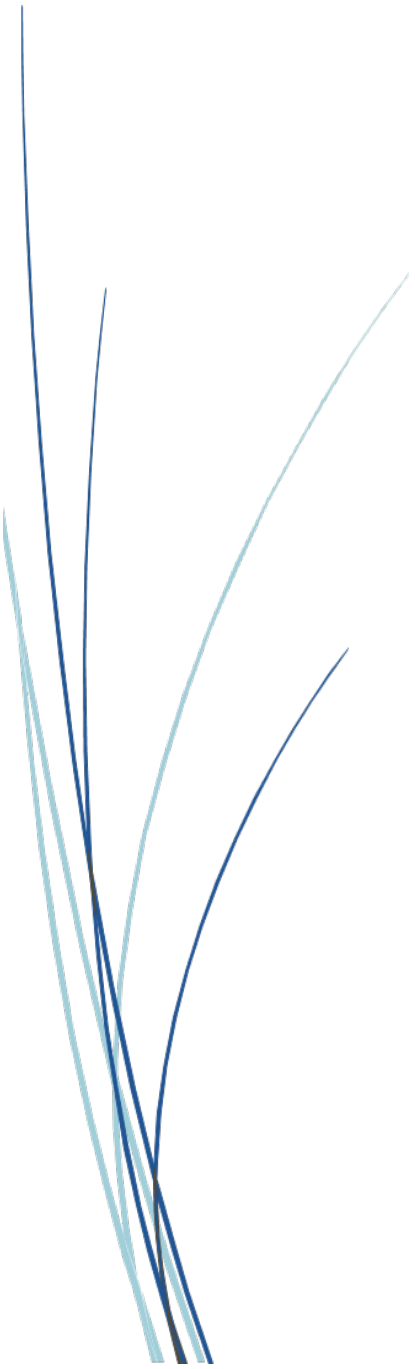
2020 Public Use Microdata Areas Program (PUMA) Participant Guide Participant Guide

Instructions for Geographic Update Partnership Software (GUPS) Participants

September 2021



United States™ Census Bureau

U.S. Department of Commerce
Economics and Statistics Administration
U.S. CENSUS BUREAU
census.gov

This page intentionally left blank.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

INTRODUCTION

A. Overview

Public Use Microdata Areas (PUMAs) are non-overlapping, statistical geographic areas that partition each state or equivalent entity into geographic areas containing no fewer than 100,000 people each. They cover the entirety of the United States, the Commonwealth of Puerto Rico, Guam, and the U.S. Virgin Islands and are a higher level of geography than census tract, or even county in some instances. They provide data users with another level of geography for data analysis.

PUMAs are defined for the tabulation and dissemination of decennial census and American Community Survey (ACS) Public Use Microdata Sample (PUMS) data. Additionally, the ACS and Puerto Rico Community Survey use them to disseminate their respective period estimates. PUMS data are valuable to state and local planning agencies/offices, as well as students, for use in long-range planning and research projects. PUMAs and PUMS data allow the data community to create custom tables and statistics not available through pre-tabulated (or summary) data products. Without PUMAs and PUMS data, data users could not create those custom tables and statistics.

The U.S. Census Bureau announced the 2020 Public Use Microdata Areas Program (2020 PUMA) through an email to the State Data Centers (SDCs) from each state, the District of Columbia, and Puerto Rico. In the announcement email, the Census Bureau invited SDCs to delineate PUMAs using the specific standards and criteria, and specifically using the census population counts and updated census tracts from the 2020 Census as critical inputs. Participation in the 2020 PUMA is voluntary. The Census Bureau provides SDCs with a 90-day review period to delineate, review, and submit their PUMAs.

Participants can maintain the PUMA boundaries that do not need revision for historical comparisons. Where modifications are needed, participants are encouraged to make revisions based on geographical knowledge and projected geographical changes in the next decade. The Census Bureau anticipates all SDCs will submit proposals for their 2020 PUMAs. If a state does not make a submission, the Census Bureau will complete the work to the best of our ability.

The Census Bureau encourages the SDCs to involve other interested data users, such as those in tribal, state, and local (e.g., county, incorporated place, and town/township) governments, as well as regional planning agencies or organizations to ensure that the PUMAs meet the needs of a variety of data users. Collaboration between SDCs and other interested data users is especially important for areas with population exceeding 100,000. Though collaboration is encouraged, the SDCs are the official participants for this program and must coordinate the delineation work suggested or prepared from others. The Census Bureau only accepts a single set of proposed PUMA delineations from each state's respective SDC.

The Geographic Update Partnership Software (GUPS), required for the preparation of the state's PUMA project, is a user-friendly, self-contained, customized GIS software application provided to participants by the Census Bureau for use in completing many of their geographic programs and operations. Each geographic program supported by GUPS includes a unique set of tools built to run within the QGIS environment. For the 2020 PUMA, GUPS is programmed to allow for the sharing of work performed by multiple participants to facilitate a collaborative delineation effort and to prepare standardized output files of the delineated PUMAs for submission to the Census Bureau. GUPS ensures the submission is valid and allows for easier processing once received by the Census Bureau. While it does not require an internet connection to function, an internet connection is necessary to use the recommended "Census Web" option and the built-in imagery server.

B. Getting Help and Using this Guide

The PUMA website[1] provides a useful overview of PUMAs and historical reference information from previous PUMA programs. The 2020 PUMA website[2] contains the key materials to support the 2020 program. To answer questions not covered in the materials or to clarify the criteria, guidelines, and procedures, contact the Census Bureau by email at <geo.puma@census.gov>.

Note: If errors or unexpected results occur within a PUMA project, close GUPS to reset the software prior to contacting the Census Bureau.

This guide provides specific instruction through "Step – Action and *Result(s)*" tables, where the Action is usually a command or action to perform a task and the *Result(s)* of the action(s) display in *italics*. Hyperlinks appear as underlined, light blue text. Readers can navigate the guide's chapters, tables, figures, and appendices by use of the Table of Contents and by use of cross-referenced links shown in **bold blue font**. Part 1 covers getting started with planning for delineation and software/project setup. Part 2 provides the details for creating a PUMA project. Part 3 closes the guide by supplying the information for submitting a PUMA project to the Census Bureau. Lastly, the appendices supply important, additional information.

[1] The URL for the PUMA website is <www.census.gov/programs-surveys/geography/guidance/geo-areas/pumas.html>.
[2] The URL for the 2020 PUMA website is <www.census.gov/programs-surveys/geography/guidance/geo-areas/pumas/2020pumas.html>.

PART 1 GETTING STARTED

This part of the guide discusses the steps necessary to begin PUMA delineation. **Figure 1** illustrates the PUMA project workflow. The first section of the diagram includes the steps for getting started. The second section shows the steps for delineating PUMAs and the third section depicts the steps for submitting a PUMA project. Each of the steps shown in the workflow, except for the download and review of program documents, becomes a chapter within this guide.

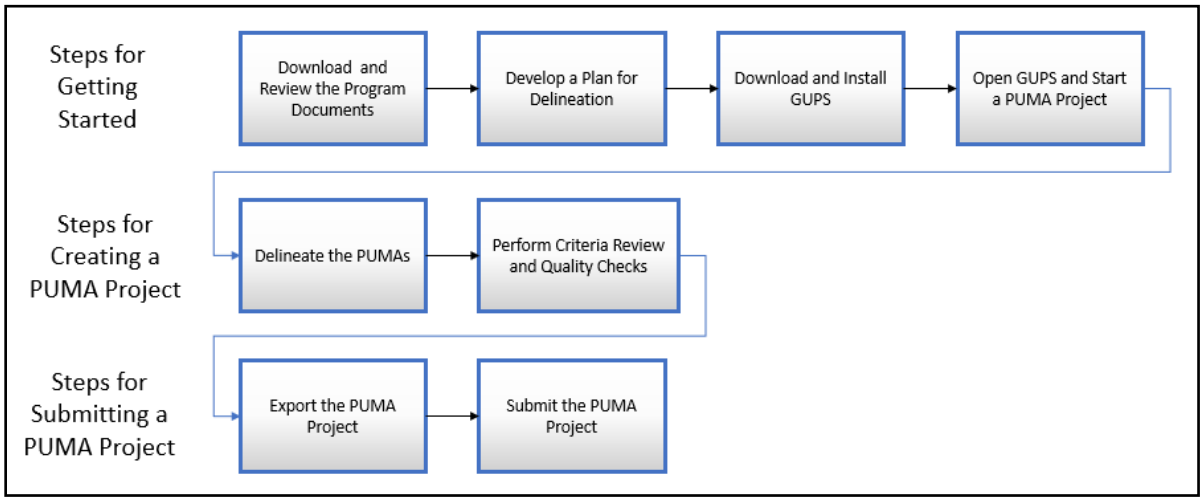


Figure 1: PUMA Project Workflow

Download the program documents from the 2020 PUMA website. At a minimum, the program documents include this participant guide, the final criteria, the coding guidelines, and the naming guidelines. A summary of these additional program materials is included in **Appendix A**. The Census Bureau recommends a thorough review of these documents to lay the foundation for the delineation process and provide an understanding of the program. Additional resource materials, such as a summary guide and a frequently asked questions document are also available online.

IMPORTANT:	GUPS, the PUMA websites, and other materials for the 2020 PUMA were in the final stages of development when this guide was created. While the images may differ, the overall instruction, actions, and results remain consistent with what is anticipated in the finalized versions. One notable difference is that the population figures and census tracts used within the examples are from 2010 and not 2020.

CHAPTER 1 DEVELOP A PLAN FOR DELINEATION

Developing a plan for delineation is an essential step to PUMA delineation. As part of developing a plan, each SDC should consider how they will conduct the work, including incorporating work performed by other interested data users (i.e., in-state data stakeholders) to determine the best delineation method(s) for their state or specific situation. If others are completing PUMA delineation work for their specific section of the state, the SDC must be prepared to import the work received into their PUMA project or load it into their project for reference and review. It is the responsibility of the SDC to determine what delineation manner works best for their state/situation and to communicate with the others assisting with delineation about how to complete the work.

IMPORTANT: The Census Bureau recommends SDCs create a folder on their computer or network, separate from the directory created by GUPS, to store the proposed PUMA delineation work (e.g., shapefiles, tabular equivalency files, text files, maps, etc.) they receive from others that are helping with delineation. Keeping them separate protects the information received should GUPS malfunction.

Review the list below to prepare for delineation.

- Communicate with other interested data users (regional organizations, council of governments, large metro counties/cities, etc.) to identify who intend to assist with delineation work .
- Download and review the PUMA documentation from the 2020 PUMA website to understand the program and expectations for participation.
- Download and install GUPS.
- Share information regarding program materials, software, and trainings with other interested data users.
- Attend a PUMA training webinar. Current plans are for three sessions (two in October and one in December).
- Maintain contact with the non-SDC staff assisting with delineation work throughout the program.
- Establish contact with the Census Bureau to answer questions.

Understanding the plan for delineation will help readers navigate the content in this guide. For example, interested data users that prepare delineations for part of a state, do not need to review the instructions in Part 3, as those are only applicable to SDCs since they make the official submission.

There are three different options for delineating PUMAs within GUPS. Participants can choose to create them from a blank layer (i.e., Create a new blank PUMA layer), import them from a from a shapefile (i.e., Import a PUMA shapefile) or census tract equivalency file (i.e., Import a PUMA tabular equivalency file). GUPS offers additional flexibility by allowing the use of more than one option for delineation which allows SDCs to assemble various sub-state level delineations into the whole state project. These three options are detailed in Chapter 4.

IMPORTANT: Regardless of the delineation option, participants are required to use the data prepared by the Census Bureau while completing the PUMA delineations. These files are the 2021 Partnership shapefiles that have been updated to include the 2020 Census population numbers (POP20 attribute) within the state-based census tract (i.e., tracts2020) layer. To confirm use of the correct version, these files will include "PVS_21_v1" in their file name and have an updated date stamp from September 2021.

Review the next chapter for instructions on downloading and installing GUPS.

CHAPTER 2 DOWNLOAD AND INSTALL GUPS

Participants with previous versions of GUPS installed for use with other Census Bureau programs must install the new version of GUPS (v14.0.0-6) to delineate PUMAs. This chapter includes the hardware and operating system requirements necessary to use GUPS, instructions for downloading and installing the software, and the basics of opening GUPS and starting a new PUMA project.

Many agencies/organizations require certain security privileges to download and install external software. Work with your local Information Technology (IT) staff person to acquire those privileges or ask they assist with GUPS installation. Please note that GUPS users with different security privileges other than the IT staff person that installed the software may encounter problems accessing the directories and plugins needed to operate GUPS. This usually occurs when the software is not installed under the user's profile. To correct this, have the IT staff person reinstall GUPS under the user's profile using the user's credentials. If installation problems remain, contact the Census Bureau by email at <geo.puma@census.gov> for assistance.

IMPORTANT:	While the SDCs are the primary participant and tasked with making their state's PUMA submission, others that intend to help with delineation work (SDC staff or other interested data users) must download, install, and use GUPS to share delineation work.

Refer to **Table 1** for the requirements necessary to download and install GUPS, as well as the supported internet browser versions to use the Secure Web Incoming Module (SWIM).

Table 1: Requirements for Using GUPS and SWIM

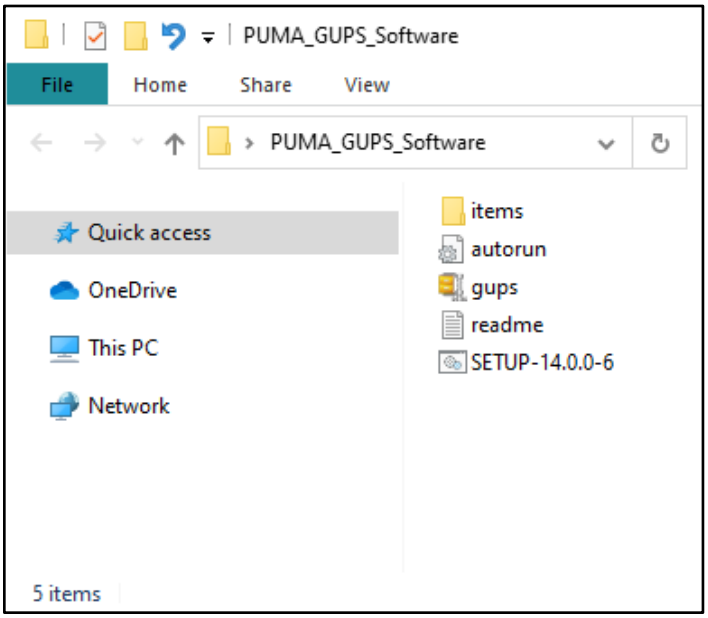
Hardware	Operating System	Supported Browser
Disk Space Required to Run GUPS: 4 GB (very important!) **Disk Space Needed to Store Shapefiles:** Shapefile sizes vary. To view the size of the shapefiles, using the mouse select a file/ folder, right-click, and select Properties in the drop-down menu. The **Files Properties** box opens and displays the file/folder sizes. Select multiple files/folders in the list to view their properties via the same method. **RAM:** 4 GB minimum; 8 GB or more recommended for optimal performance.	**Windows®:** To run GUPS, Windows users need one of the following operating systems: • Windows 8® • Windows 10® **Apple®:** Mac OS X users must secure a license for Microsoft Windows and use a Windows bridge. The suggested bridge software is Boot Camp®, which comes pre-installed on all Mac computers. Locate instructions for Boot Camp at: <www.apple.com/support/bootcamp/getstarted/> IMPORTANT: Since Boot Camp requires a restart of the computer to set up the bridge, be sure to print the instructions from URL above before beginning installation.	**SWIM runs on the two most recent versions of each of these major internet browsers:** • Microsoft Internet Explorer® • Microsoft Edge® • Google Chrome® • Mozilla Firefox® • Apple Safari®

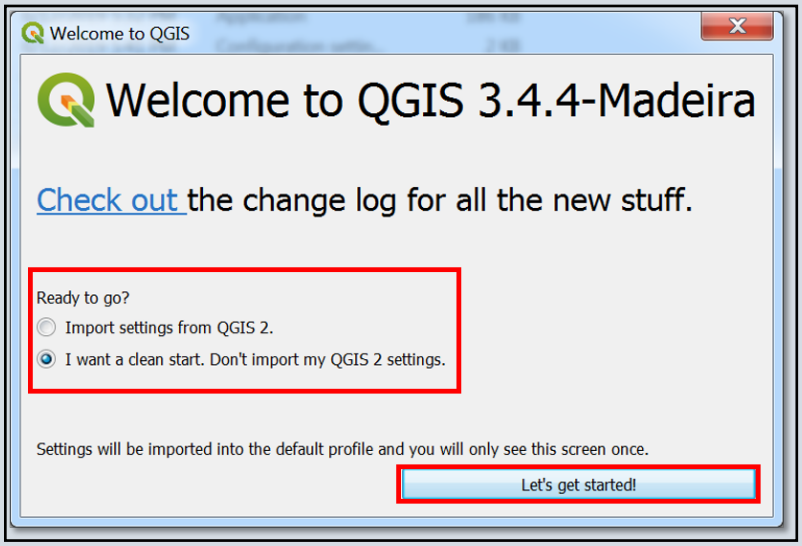
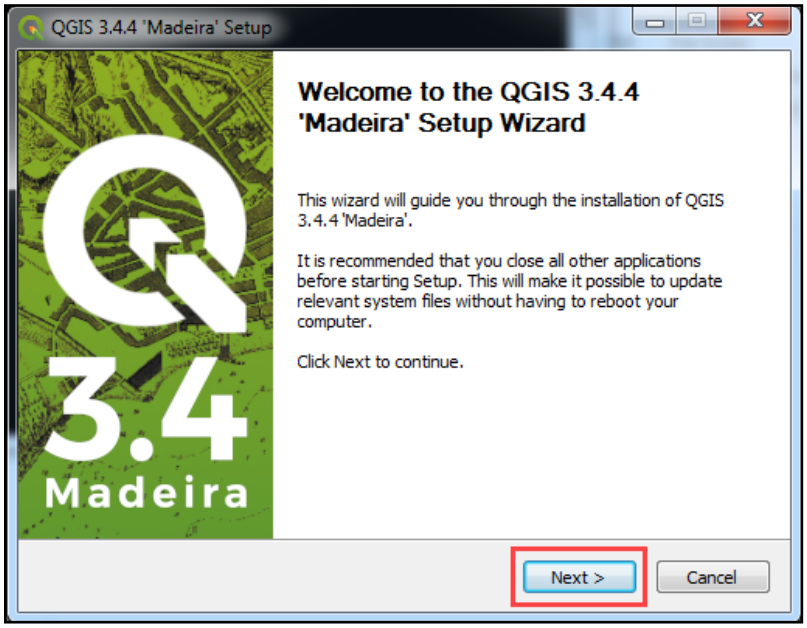
Note: The dialog boxes in GUPS may vary based on operating system. Screenshots in this guide were created using Windows 10. As a result, the screenshots in this guide that feature GUPS actions may differ slightly from what a participant using Windows 8 or Boot Camp.

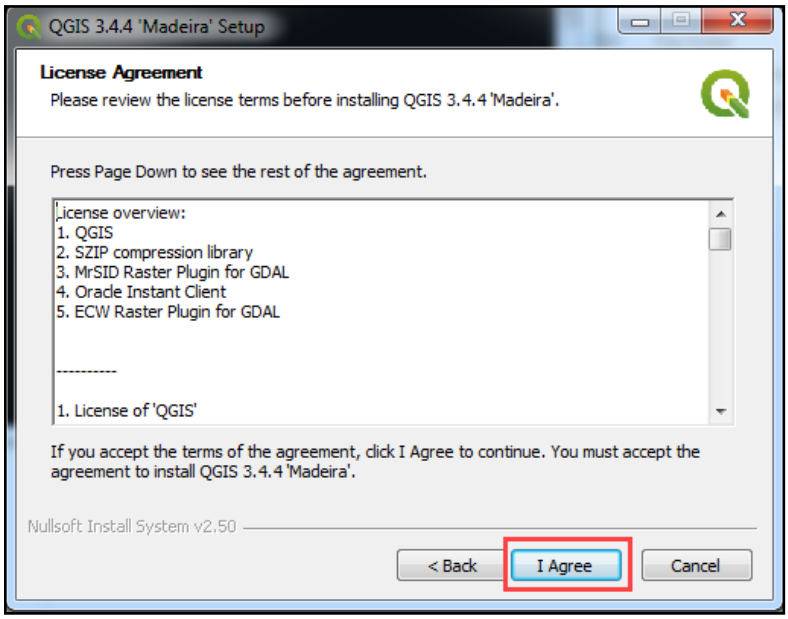
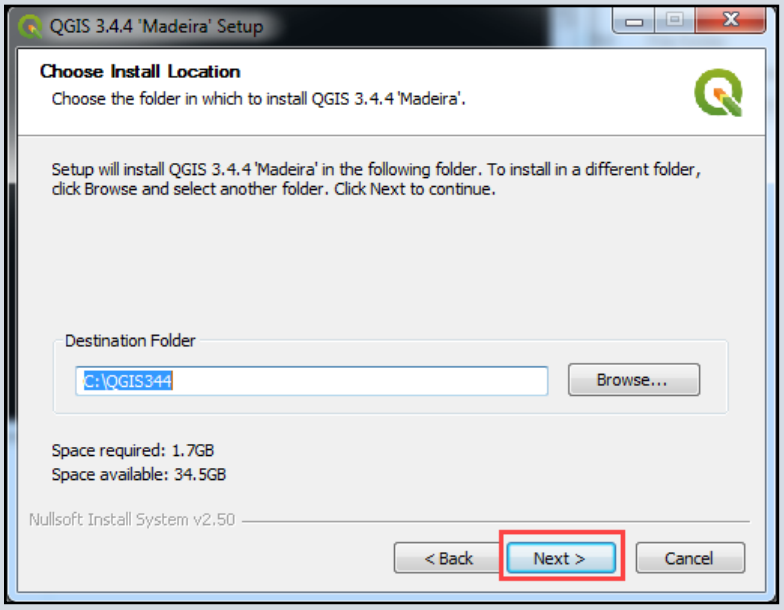
Follow the steps outlined below in **Table 2** to download and install GUPS.

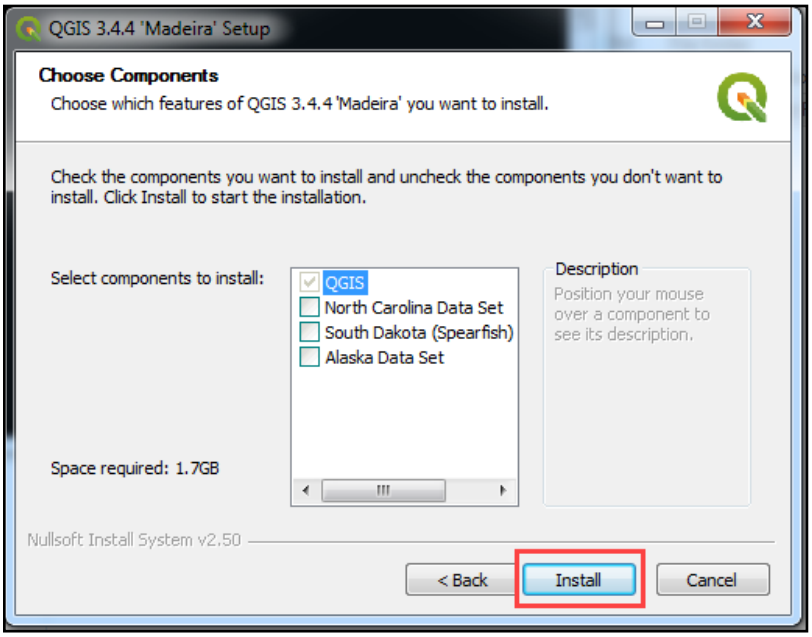
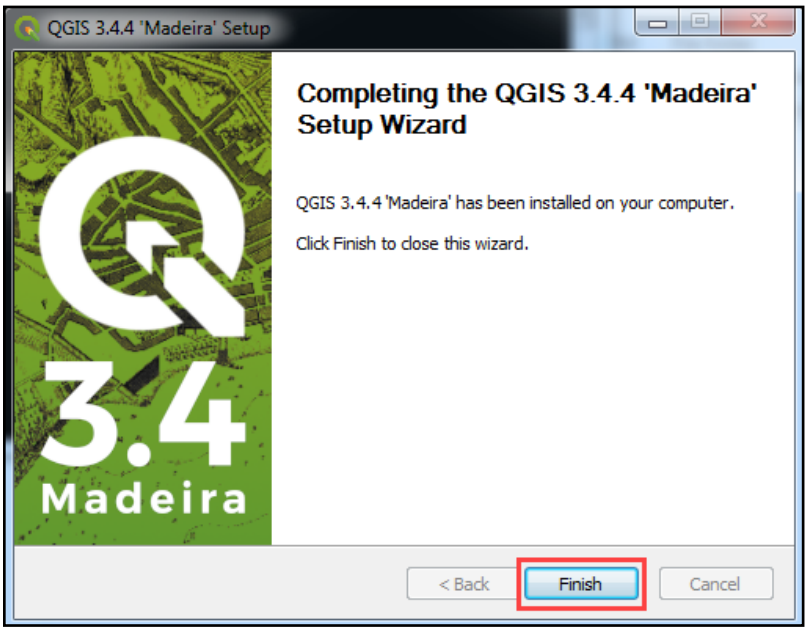
Table 2: Steps to Download and Install GUPS

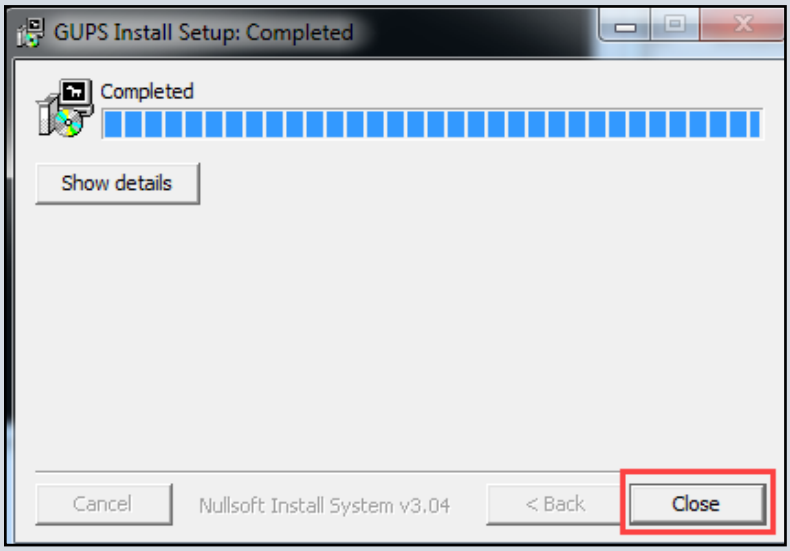
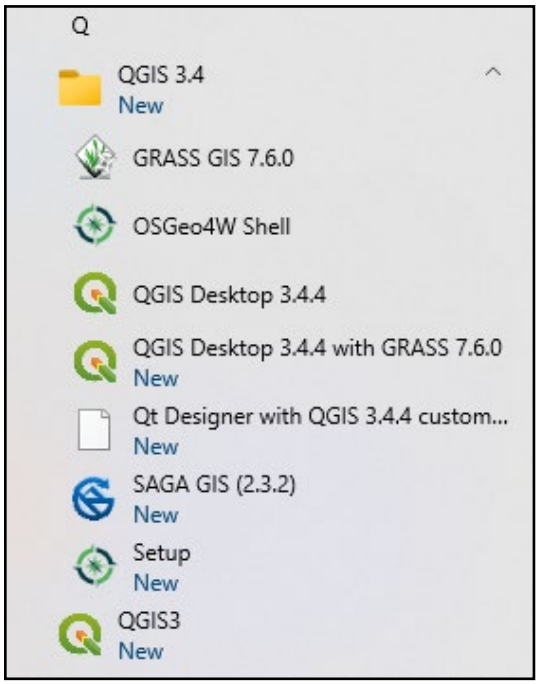
Step	Action and *Result(s)*
Step 1	Navigate to the 2020 PUMA website and scroll to the **Geographic Update Partnership Software (GUPS)** section.
Step 2	Choose the **Download GUPS** link. Select **Save As** rather than **Save** to navigate to a local folder to download and save the **gups.zip** file.

Step	Action and *Result(s)*
Step 3	Navigate to the local folder where the downloaded **gups.zip** file resides and unzip the file to extract the contents. When complete, it should resemble this example. 
Step 4	From the local folder where the gups.zip file extracted, use the mouse to double-click the **SETUP-<version>.bat** file to start installation. The anticipated version number is 14.0.0-6.
	Regardless of the version number, there will be only one SETUP .bat file to choose.

Step	Action and *Result(s)*
Step 5	*The **Welcome to QGIS** screen appears that allows a participant to import their previous settings from QGIS 2 or starting clean.*  Choose the option for a "clean start" and select **Let's get started** to proceed. If a new version of GUPS that uses QGIS 3 is already installed for use with other census programs, the previously mentioned window may not appear.
Step 6	When the installer opens, *the **Welcome to the QGIS 3.4.4 'Madeira' Setup Wizard** screen appears.*  Before proceeding with installation, close all other programs or applications. Once other programs and applications are closed, choose the **Next** button.
	The version needed for the 2020 PUMA is QGIS 3.4.4 Madeira. If the exact same version of QGIS exists on the computer, an instruction to uninstall and reinstall may appear. Participants may retain other versions of QGIS that may be in use for other programs, but the Census Bureau suggests reinstalling if the same version exists on the computer to ensure installation of the latest update.

Step	Action and *Result(s)*
Step 7	*The **License Agreement** screen appears.*  Read the License Agreement and choose the **I Agree** button to continue.
Step 8	*The **Choose Install Location** screen opens*. For performance and stability, the Census Bureau recommends installation to the default folder (e.g., C:\QGIS344) even though the **Browse** button allows for changing of the installation folder.  Choose the **Next** button to continue.

Step	Action and *Result(s)*
Step 9	*The **Choose Components** screen opens.* The '☑QGIS' in the **Select components to install** section is checked and grayed out since it is the default.  Choose the **Install** button to continue.
	To review a previous screen or reread the license agreement, choose the **<Back** button (each screen contains this button).
Step 10	*The **Completing the QGIS 3.4.4 'Madeira' Setup Wizard** screen appears to confirm installation.*  Choose the **Finish** button to finish the QGIS update and launch the GUPS update. The installation can take five to 10 minutes to complete.

Step	Action and *Result(s)*
Step 11	*The **GUPS Install Setup: Completed** screen opens and displays the status of the installation.*  Choose the **Close** button to close the window.
Step 12	Once installed, *QGIS 3.4 appears in the Start Menu's All Programs list*. Please note depending on operating system, the image shown below may vary slightly.  Use **QGIS Desktop 3.4.4** or the **QGIS3** icon to launch GUPS. Disregard the other software installed. They are not needed for the 2020 PUMA.

After successfully installing GUPS and QGIS for use in the 2020 PUMA, participants are ready to begin their delineation work. Review the next chapter for instructions on opening GUPS and starting a new PUMA project.

CHAPTER 3 OPEN GUPS AND START A PUMA PROJECT

After successfully downloading and installing GUPS, PUMA delineation may begin. There are two options to access the data within GUPS: Census Web and My Computer. The CD/DVD option is not a valid option. **Figure 2** provides a visual of the Map Management window with all three options shown.

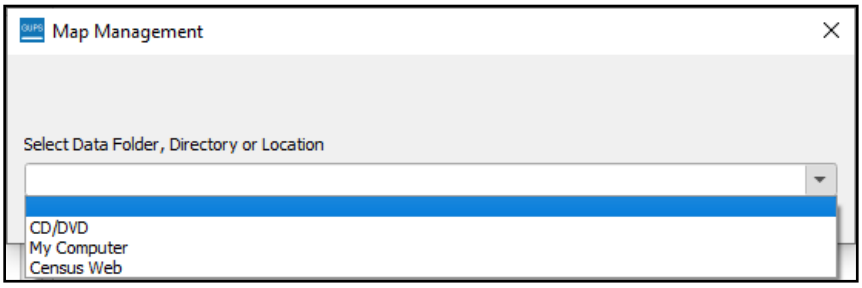
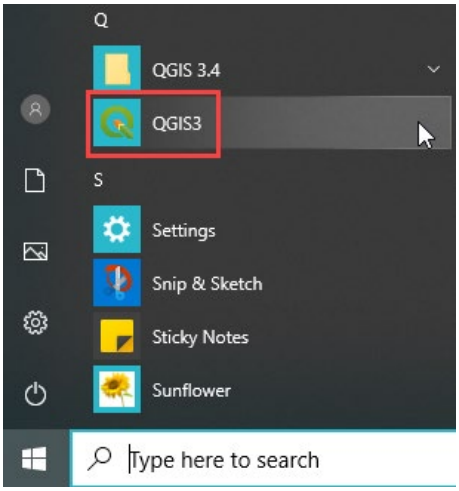
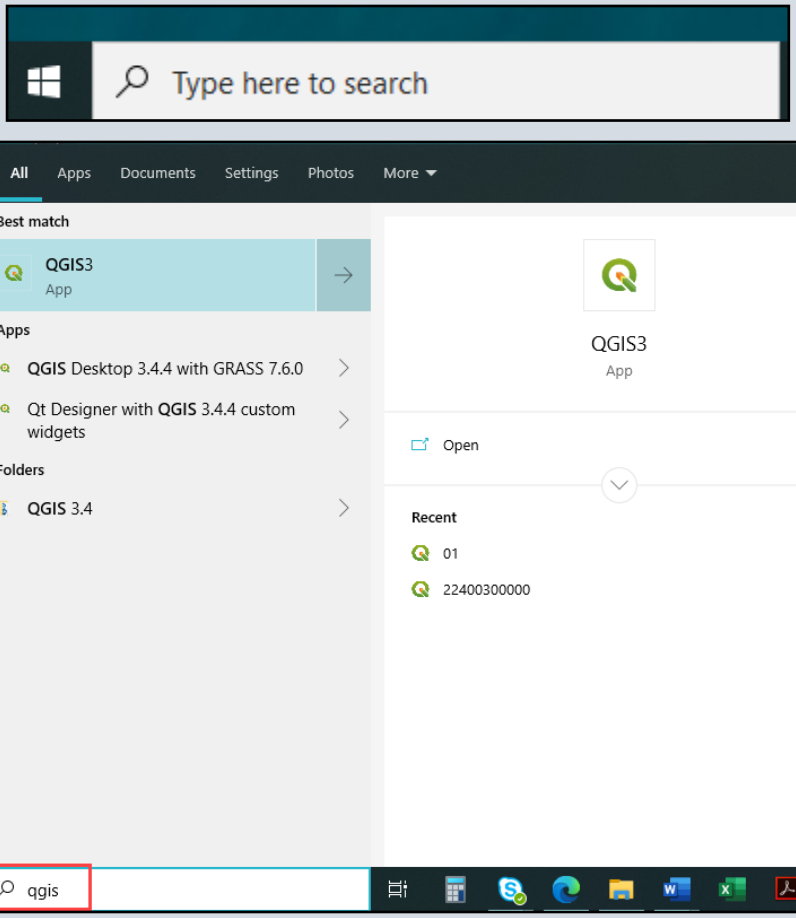


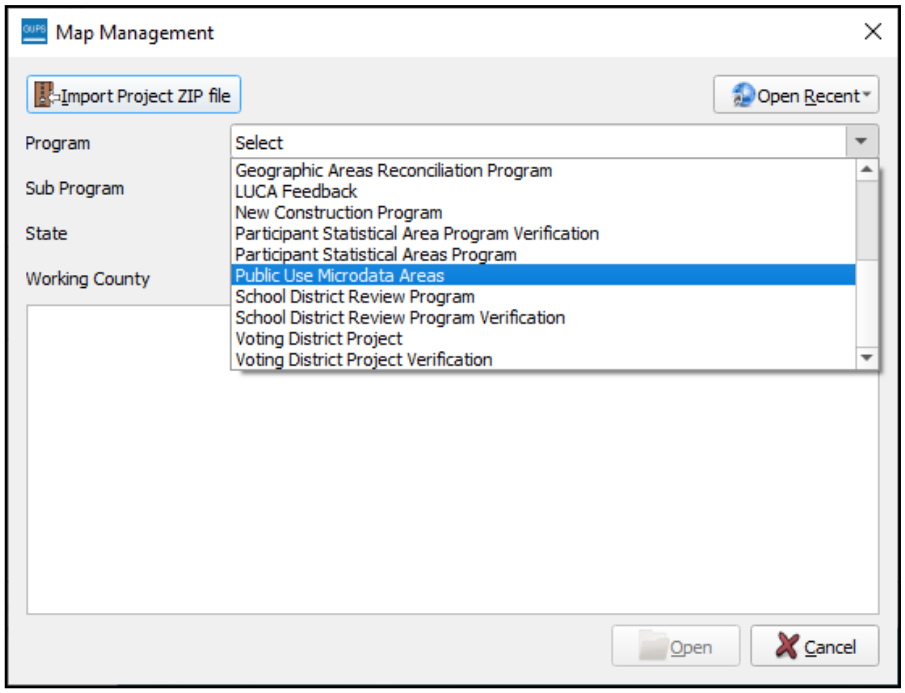
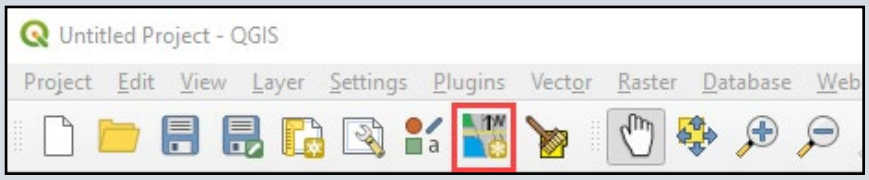
Figure 2: Map Management Window

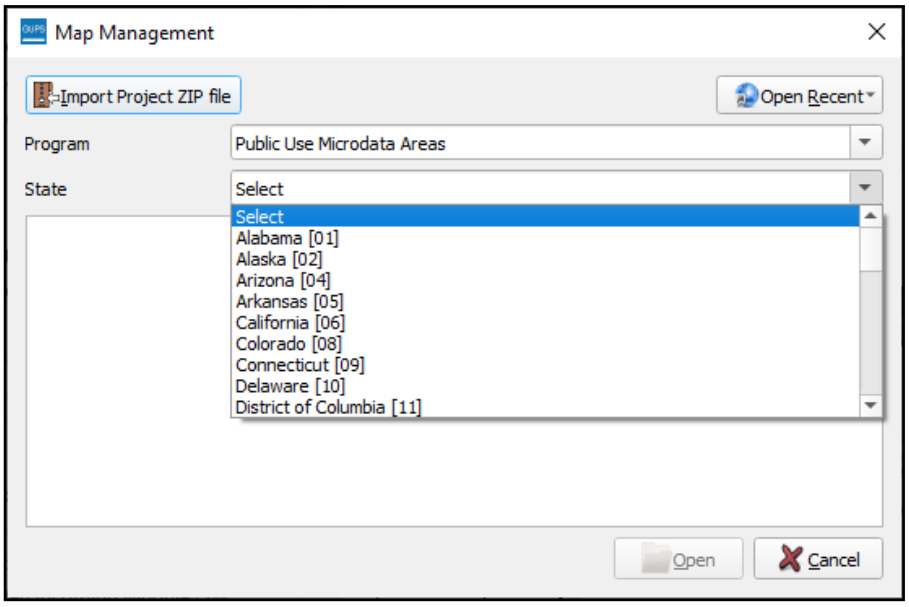
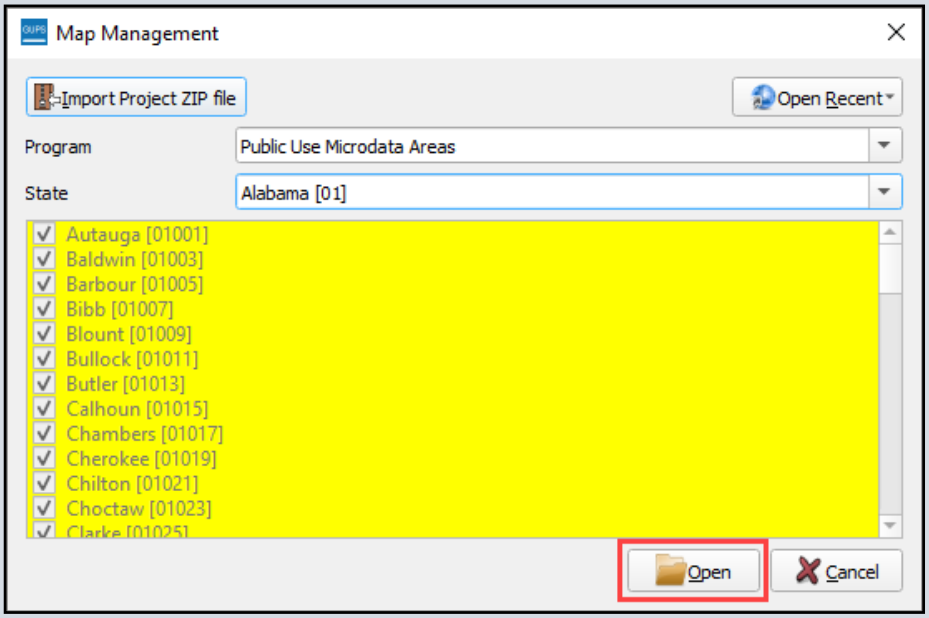
The Census Web option downloads the appropriate shapefiles directly into GUPS from the Census Bureau's servers. This is the recommended for the 2020 PUMA. Follow steps listed in **Table 3** to open GUPS and start a new PUMA project using the Census Web option. The My Computer option is not recommended but is available if a participant is unable to use the Census Web option. Refer to **Appendix D** for details on using the My Computer option.

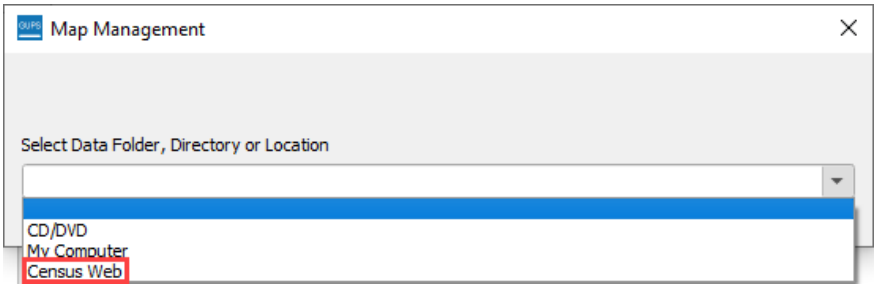
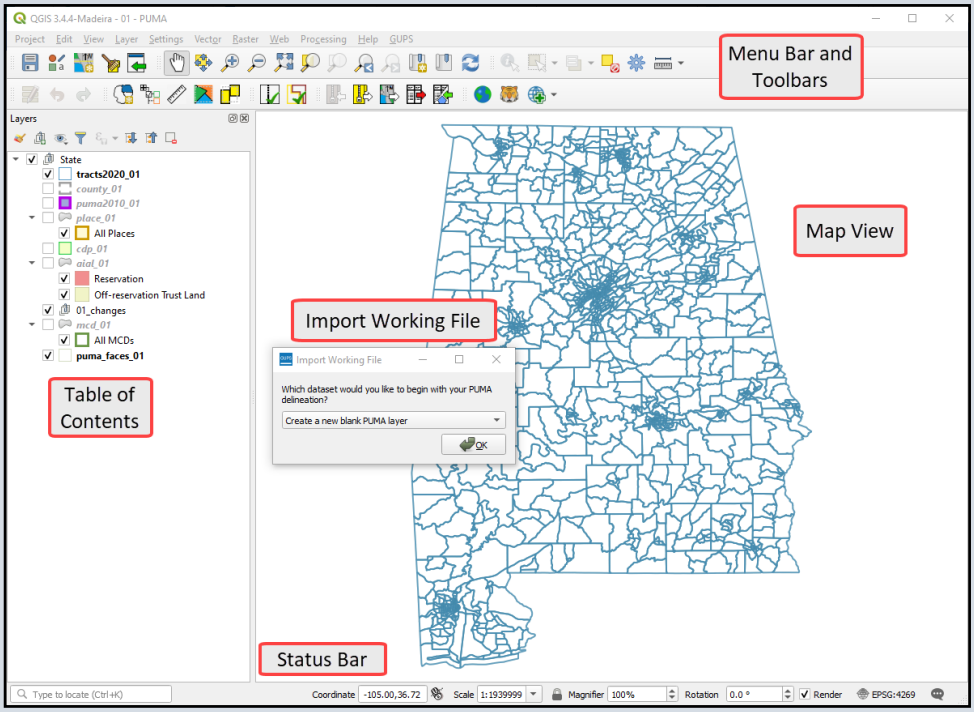
Table 3: Steps to Open GUPS and Start a PUMA Project Using Census Web

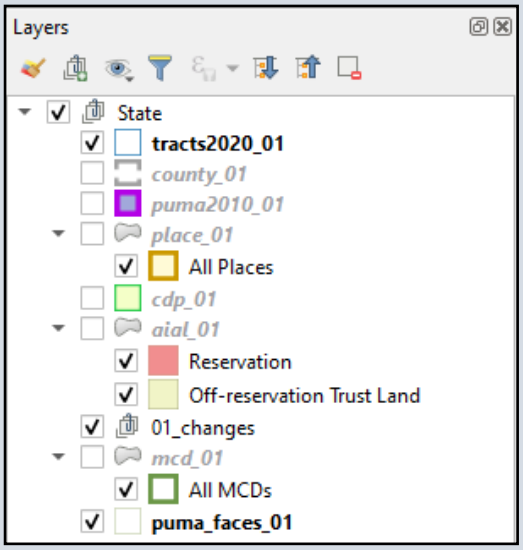
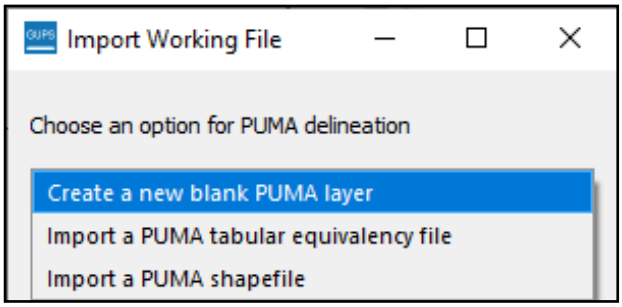
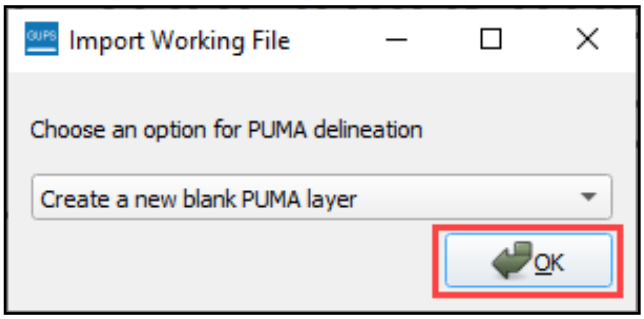
Step	Action and *Result(s)*
Step 1	To open GUPS, select the **QGIS3** icon from the Start Menu.  *The QGIS splash screen appears*. Depending on the age of the computer and amount of RAM, the application may require a few moments to load and open. 

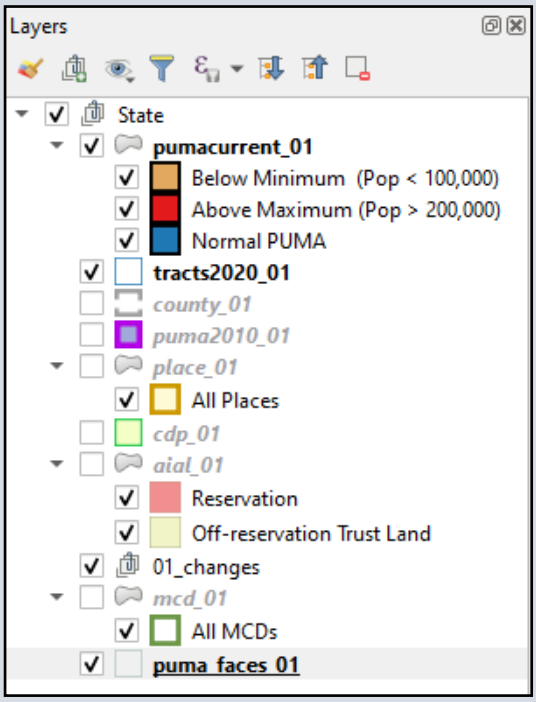
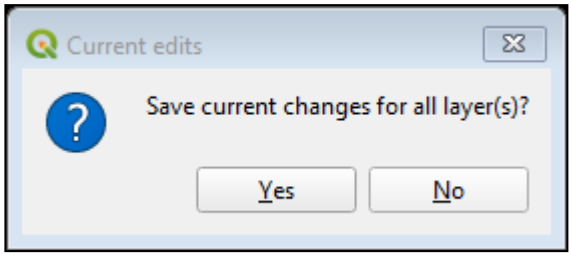
Step	Action and *Result(s)*
	A participant can also locate QGIS by typing ‘qgis’ in the Search area at the bottom left of the screen, near the Start button, in Windows 10. 

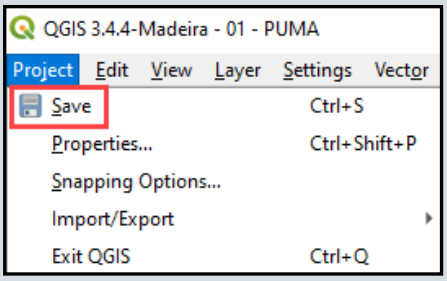
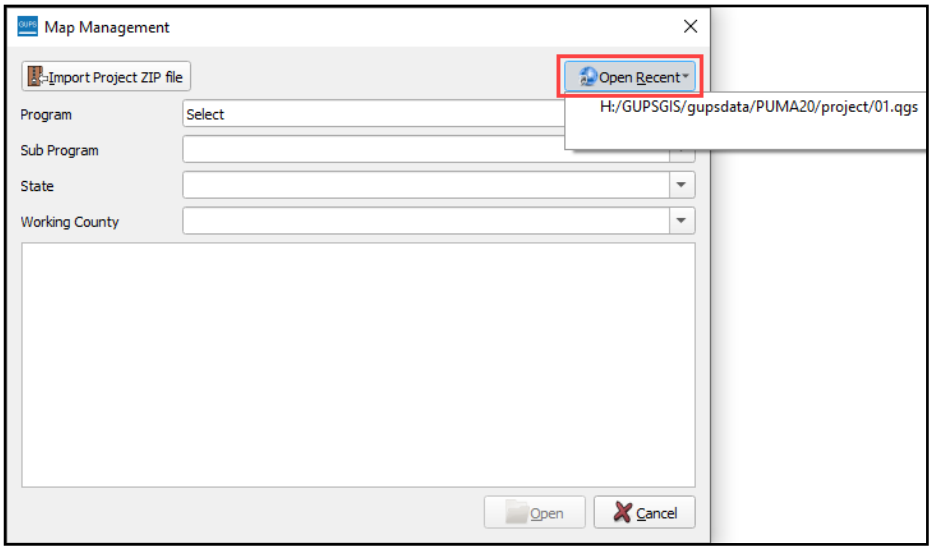
Step	Action and *Result(s)*
Step 2	*The **Map Management** window appears.*  Use the drop-down menu next to the **Program** field to select **Public Use Microdata Areas**.
	If the Map Management window does not appear, choose the Map Management button from the Standard toolbar (shown below highlighted by a red rectangle). If it still does not appear, refer to **Appendix B** for troubleshooting tips. 

Step	Action and *Result(s)*
Step 3	Choose the state from the **State** drop-down menu. 
Step 4	With the state selected, the **Open** button activates for selection. *All counties for the state appear in the window below the state name and are selected to open*.  Choose the **Open** button to continue.

Step	Action and *Result(s)*
Step 5	*A secondary **Map Management** window appears to select the data source*. From this secondary **Map Management** window, choose **Census Web** from the **Select Data Folder, Directory or Location** drop-down menu to download the shapefile data layers with preset symbology and labels directly into GUPS.  Reminder: The Census Bureau recommends the use of the **Census Web** option to download the shapefiles directly into GUPS, but for those participants that choose to download the shapefiles onto their local computer or network, refer to **Appendix D** for steps to use the My Computer option. The CD/DVD option will not be used.
Step 6	After the data loads into GUPS, *the **Table of Contents** populates and symbolizes according to preset styles. The **Map View** fills with the working state. The **Menu Bar and Toolbars** appear along the top and the **Status Bar** appears at the bottom of the screen. The **Import Working File** window awaits the participant's selection for how to begin PUMA delineation*. Refer to sub-chapter **3.1** for high-level information on the main page elements and default layout. 
	The **QGIS 3.4.4 Madeira** and **PUMA** display at the very top left of the application window, along with the two-digit FIPS code of the state. This information helps a participant confirm use of the newer QGIS version and selection of the correct state and program.

Step	Action and *Result(s)*
Step 7	*Basic data layers initially load into the Table of Contents before choosing how to begin delineation*. They are shown below. 
Step 8	Participants choose how to begin their delineation work from one of three options in the **Import Working File** window: **Create a new blank PUMA layer**; **Import a PUMA tabular equivalency file**; or **Import a PUMA shapefile**. Each option is detailed in Chapter 4.  Choose an option and the **OK** button to proceed. 

Step	Action and *Result(s)*
	*The **Table of Contents** updates to include additional data layers for delineation*. In this case, the "**pumacurrent_01**" data layer is added since the **Create a new blank PUMA layer** option was selected.  The symbolization of the "pumacurrent" layer is vital to understanding the acceptable delineations in the Map View. PUMA delineations that fall below the minimum threshold appear in gold/tan while those that fall above the threshold are symbolized with red. Use of color brings a visual aid to the delineation process.
Step 9	To save a project, use the **Save Project** button on the **Standard toolbar**. Otherwise, delineation work will be lost.  *The **Current edits** confirmation dialog box appears*. Choose the **Yes** button to save or the **No** button to cancel without saving the project. 

Step	Action and *Result(s)*
	Participants may also use the **Save** option beneath the **Project** tab on the **Menu bar** to save the project. 
Step 10	To reopen a saved project, expand the menu beneath the **Open Recent** button in the **Map Management** window. *The drop-down list provides a list of current projects created using GUPS to reopen*. 

With the steps for opening GUPS and starting a PUMA project using Census Web presented, proceed to the sub-chapter for an introduction to the GUPS menus and toolbars.

3.1 GUPS Menus and Toolbars

The GUPS main page elements introduced above in Step 6 of Table 3, and shown below in **Figure 3**, are further explained in this sub-chapter to build familiarity with the software and the default layout.

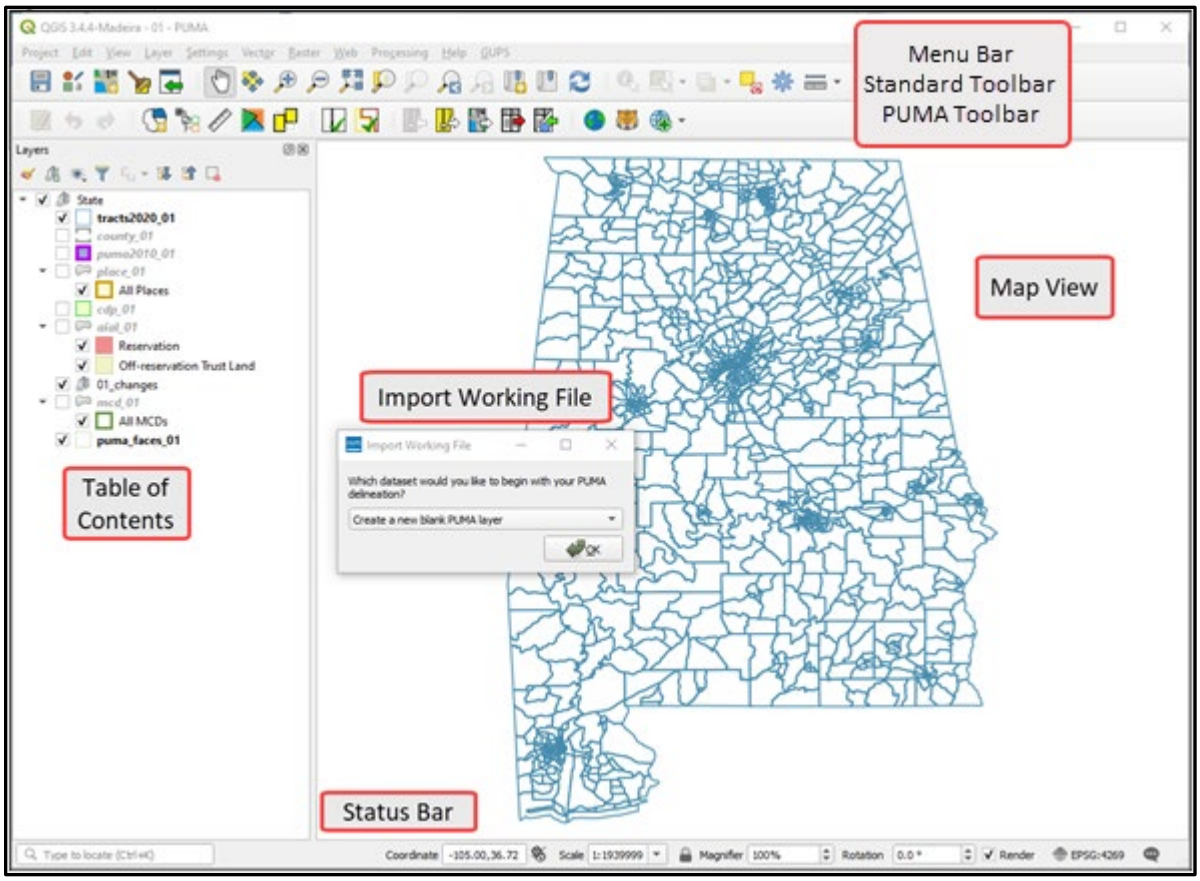


Figure 3: GUPS Main Page Elements and Default Layout

Refer to **Table 4** for high-level information about the elements that comprise the main page once PUMA GUPS is opened. Detailed descriptions and functions of menus, sub-menus, and toolbars is in **Appendix C**.

Table 4: GUPS Main Page Elements and Their Function/Description

Page Element	Function/Description
Menu Bar	Permits access to QGIS and GUPS features using a standard hierarchical menu. Offers basic features such as Settings and Help; tools to manage the Map View. Almost all functions available in Menu bar are available in toolbars. Refer to sub-appendix **C1** for more details.
Standard Toolbar	Provides navigation functions and other tools needed to interact with the Map View and layers. Refer to sub-appendix **C2** for more details.
PUMA Toolbar	Provides tools for specific to the 2020 PUMA as well as some tools from previous Census Bureau programs. See sub-section **3.1.1** below for descriptions of the buttons.
Map View	Displays the default data layers for the 2020 PUMA. Reflects the colors and symbology of layers in the Table of Contents.

Page Element	Function/Description
Table of Contents	Depicts the layers in the Map View. Layers have been pre-styled and arranged for optimal use as part of the Census Web option. However, layers can be managed by manipulating the visibility (i.e., check/uncheck the layer) or reorganized using tools from the Table of Contents toolbar that appears at the top of the Table of Contents. Refer to sub-appendix **C3** for more details.
Status Bar	Displays information on the coordinates, map scale, magnification, rotation, and projection. Allows for adjustment of the display. Refer to sub-appendix **C4** for more details.

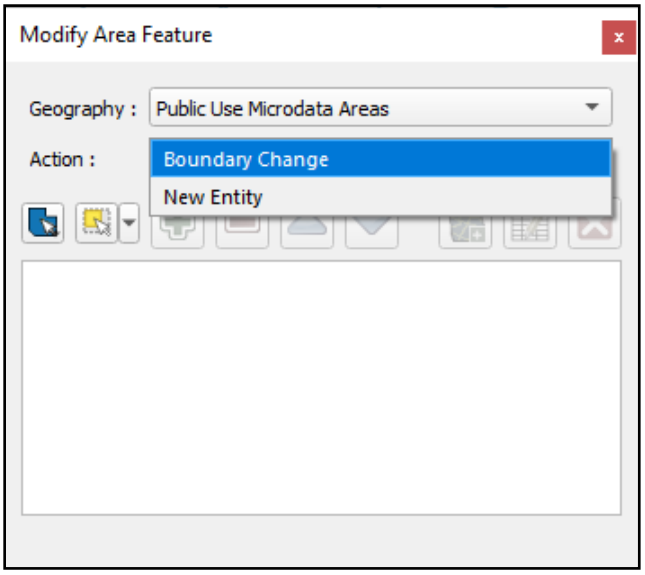
3.1.1 PUMA Toolbar

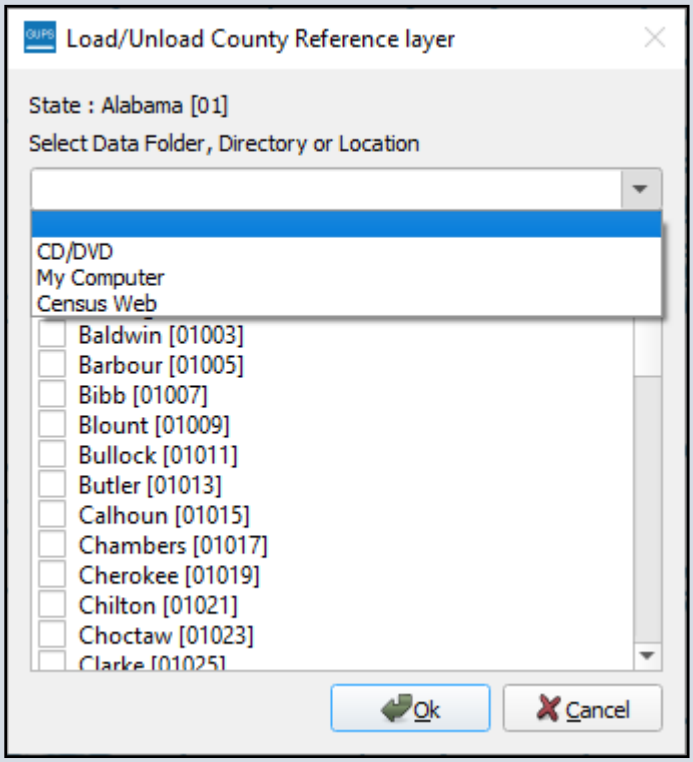
The PUMA toolbar, shown in **Figure 4**, includes buttons used specifically for PUMA delineation.

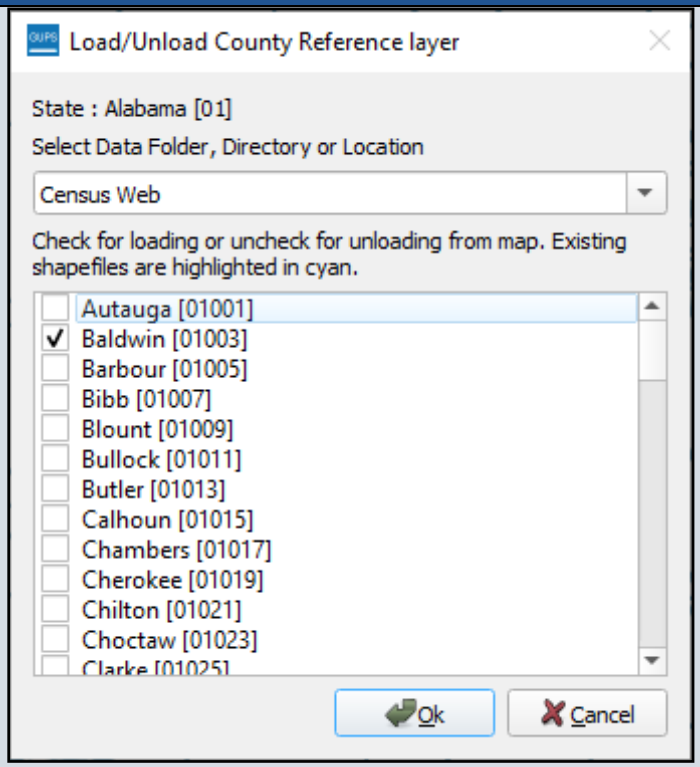
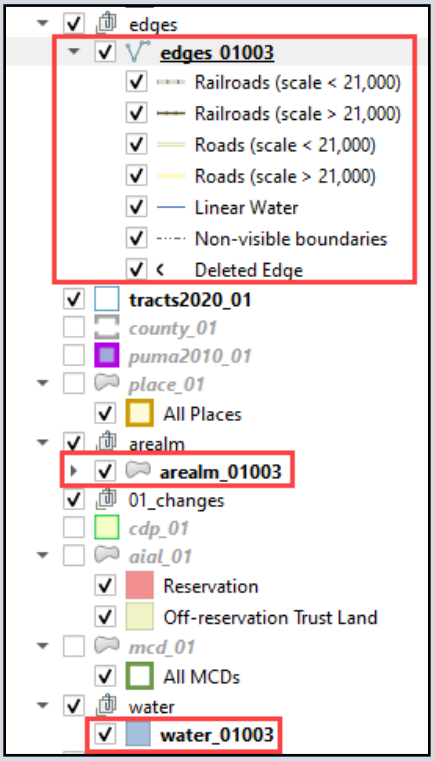
Figure 4: PUMA Toolbar

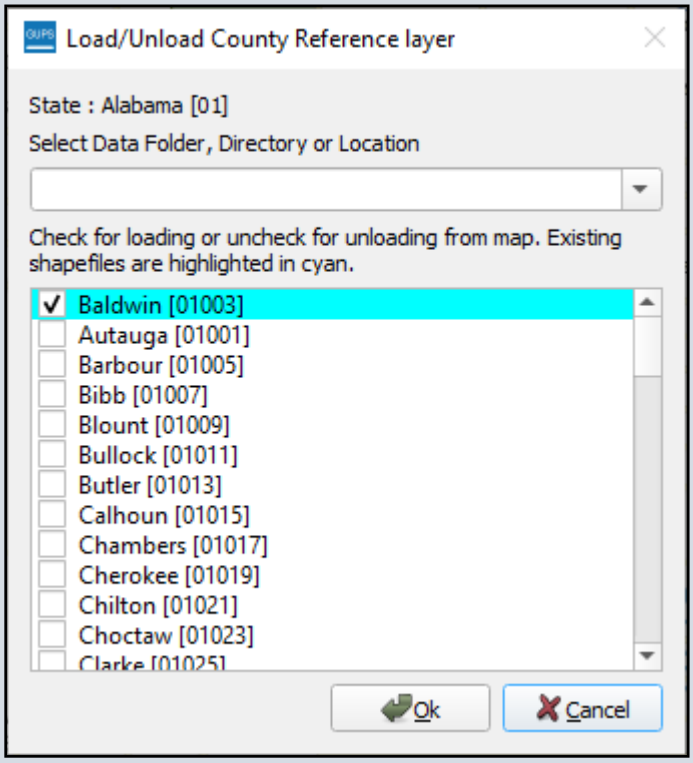
Table 5 defines each button's use, while Chapter 4 illustrates their use.

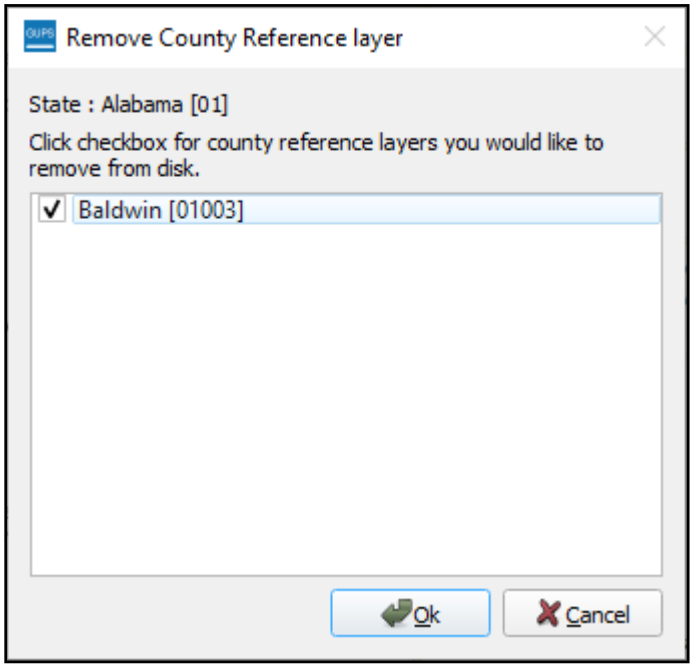
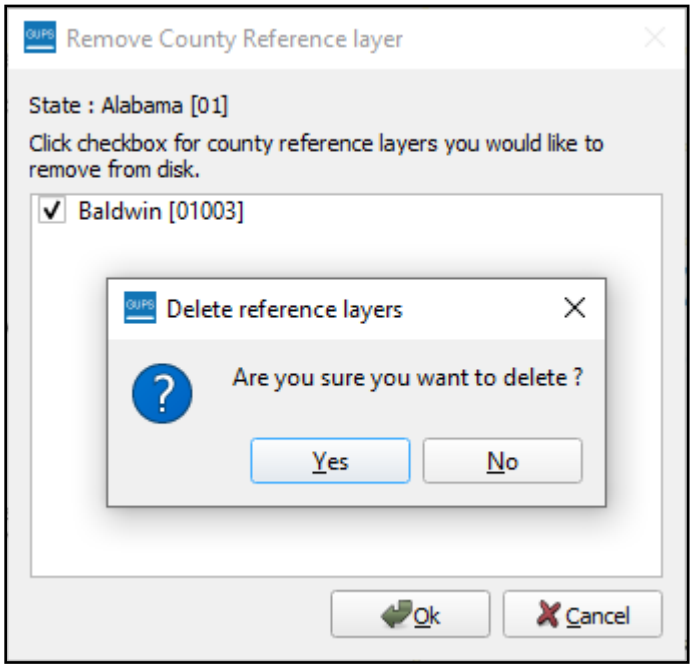
Table 5: PUMA Toolbar Buttons and Their Function/Description

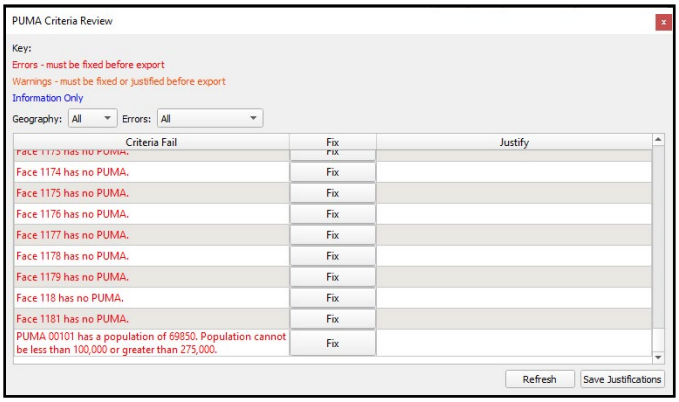
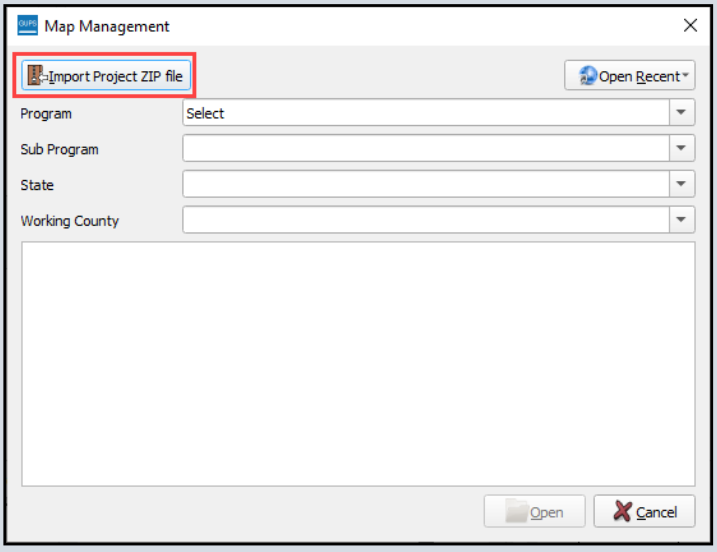
Button	Name	Function/Description
	Modify Area Feature	Chooses the geography (e.g., **Public Use Microdata Areas**) and action (e.g., **Boundary Change** or **New Entity**) for the delineation. This button is a major component of PUMA delineation work and is used extensively in Chapter 4. 
	Show/Hide Legend	Shows or hides the legend (e.g., Table of Contents). It may be helpful to close the legend to make more screen space for the Map View.

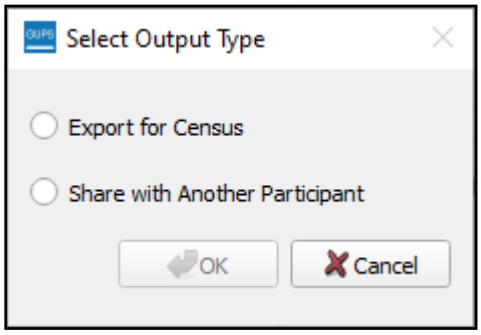
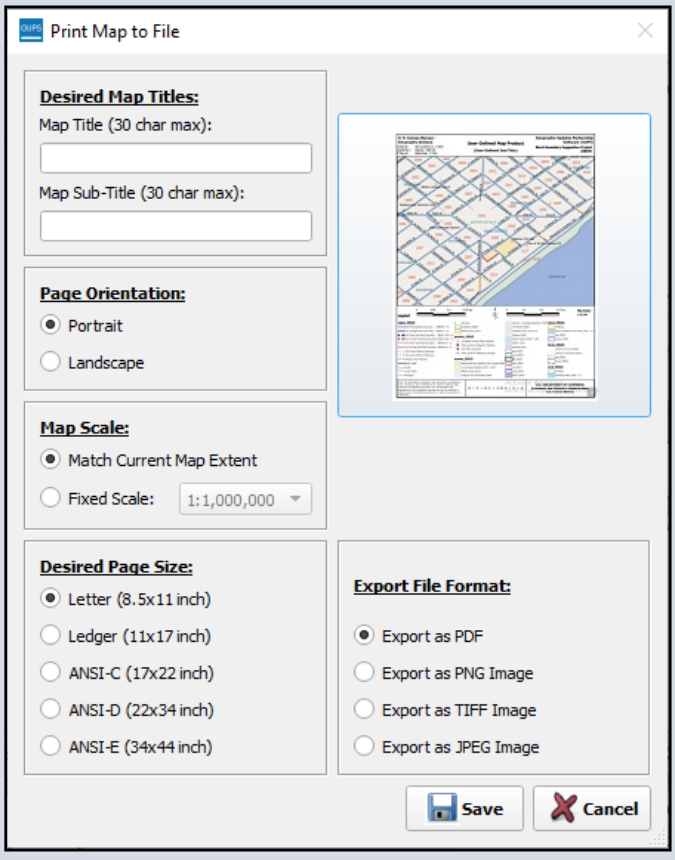
Button	Name	Function/Description
	Scale Bar Tool	Permits the selection of units of measure to display in the scale bar as well as the color of the scale bar to display in the Map View.
	Load/Unload County Reference Layer	Permits loading and unloading of county-level reference layers into the PUMA project for any county within the state. This button permits loading of census spatial layers for the selected county(s). Reference layers (e.g., roads, railroads, area landmarks, water, etc.) may prove useful for participants to better orient themselves within a county with multiple PUMAs. The same three options, **CD/DVD**, **My Computer**, and **Census Web**, available when opening the project are used to load reference layers.  The Census Bureau strongly advises participants use the **Census Web** option to automatically upload the shapefiles on the census servers into the PUMA project.

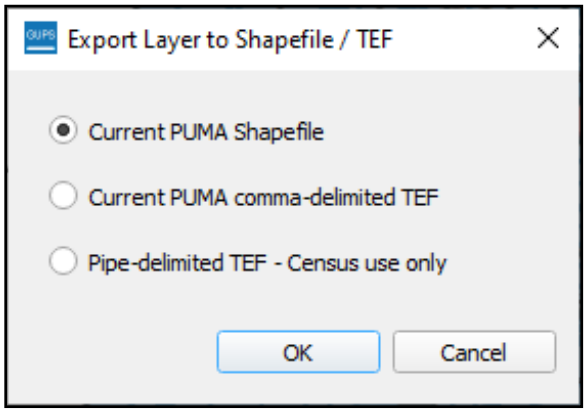
Button	Name	Function/Description
		 The loaded layers (edges, area landmarks, water, etc.) appear in the Table of Contents nested in their respective layers with the inclusion of the state and county FIPS code. 

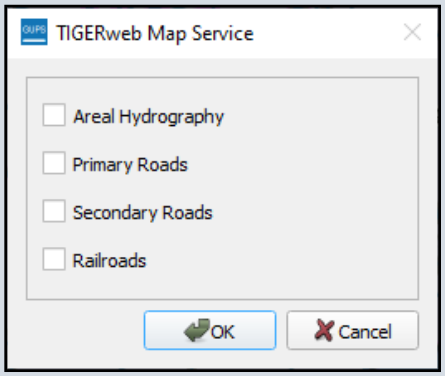
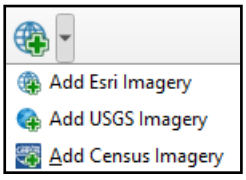
Button	Name	Function/Description
		Scale dependency, as shown for the edges layer above, prevents the layers from displaying in the Map View until the specific scale is reached. To unload a layer from the PUMA project, simply choose the button again and check the county to unload. Loaded counties appears at the top of the list and in the color of cyan. The unload option removes the layer from the PUMA project, but does not delete the data that is stored in the GUPS working directories.  Select the **OK** button to unload the county.

	Remove County Reference Layer	Removes a loaded county reference layer from the project and deletes the data from the computer. Participants use this button when they determine they no longer need to reference the county level data. Once a county is removed, participants would use the **Load/Unload County Reference Layer** button to load the county-reference layers back into the project. Add a checkmark to the county(s) that appears on the list to remove them from the project.  After selecting **OK**, a warning appears to confirm deletion.  Choose **Yes** to remove/delete the county from the project or **No** to return to the previous window.

Button	Name	Function/Description
	Geography Review	Not used for the 2020 PUMA. Filters a layer based on field values in the attribute table. It provides access to the attributes of the selected layers. This button does not allow for changes to the geography.
	PUMA Criteria Review	Generates a list of criteria threshold failures and allows for corrections to or justifications for the failures. This mandatory check is required before exporting the file for submission. This button can be executed throughout the delineation process or at the end of work, prior to exporting for submission to the Census Bureau. 
	Import State Zip	Imports another participant's "DataDirectory" output .zip file for review or editing by another person. GUPS generates this .zip file as part of the **Export to Zip – Share with Another Participant** option. This file is the whole state's PUMA project and cannot be used if the same project is open in GUPS. This button will not work if the same project is open. As an alternative, use the **Import Project ZIP file** button on the **Map Management** window prior to opening any project. 

Button	Name	Function/Description
	Export to Zip	Includes two export options: **Export for Census** and **Share with Another Participant**.  Use **Export for Census** option to create the .zip file of the PUMA project that contains all required data for submission to the Census Bureau. Use **Share with Another Participant** option to share work with others. This method of sharing, rather than exporting and importing files, permits staff in the same office to review an entire project.
	Print Map to File	Exports a printable map in *.pdf, *.png, *.tiff, or *.jpeg format. This tool allows users to assign a map title and sub-title and to set the page orientation, scale, and page size. 

Button	Name	Function/Description
	Export Layer to Shapefile/TEF	Exports the current PUMA layer or PUMA faces layer in the PUMA project either to a shapefile or to a tabular equivalency file (TEF), respectively. This button is used to share PUMA delineation work and can be used to share all or part of the state. 
	Import Working File	Serves two functions: 1) Begins the delineation of PUMAs and 2) Imports PUMA delineation work for some/all PUMAs in a state. Initially this window appears when starting a project and is how a participant begins their delineation work, but the button is also used to import work of other participants if work for the state was shared among interested data users. For example, if a state that is working with a regional planning agency to prepare part of the state's PUMAs: • The regional planning agency would perform their delineation work in GUPS and use the **Export Layer to Shapefile/TEF** button once they completed their work. • The SDC would then use the **Import Working Files** button to import the exported shapefile for TEF that represents the portion of the state's delineations created by the regional planning agency into their PUMA project or the SDC would add the shapefile as a reference layer using the **Add Layer** menu from the **Menu bar**.
	Internet Map Service	Opens a GIS map service from the internet (i.e., Google Maps or Bing Maps) after selecting a point in the Map View. The intent of this tool is to provide visual assistance from an external source. An internet connection is required for this button to function.

Button	Name	Function/Description
	TIGERweb Map Service	Permits loading of census spatial data from Census Bureau's TIGERweb Map Service (WMS). The selected data layers load into the Table of Contents of the project. To remove the loaded layers, relaunch the button and uncheck the selected layers.  Because participants can use the **Load/Unload County Reference Layer** button, they may not find this button necessary.
 	Add Imagery / Remove Imagery	Adds imagery to the PUMA project. The imagery loads near the bottom of the Table of Contents, so it underlies other layers. The button includes three imagery options: **Add Esri Imagery**, **Add USGS Imagery**, or **Add Census Imagery**. Remove imagery by using the same button. It will change to include a red negative symbol, or participants can remove imagery by using the mouse to right-click on the imagery layer in the Table of Contents. IMPORTANT: The Census Bureau recommends turning off or removing the imagery prior to saving the PUMA project.

PART 2 CREATING A PUMA PROJECT

This part of the guide provides the technical instruction for delineating PUMAs using GUPS. The chapters include details on the various options for delineation as well as information on the quality checks performed on the PUMA project. Everyone who delineates PUMAs should review the content in this part of the guide.

CHAPTER 4 DELINEATE THE PUMAS

This chapter includes three sub-chapters that describe the technical details and steps for the each of the three delineation options, as well as two sub-chapters that describes modifying or deleting a PUMA and exporting PUMA delineations.

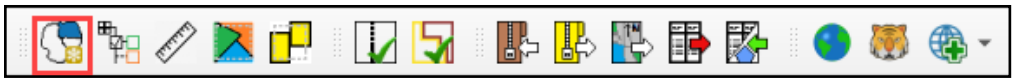
Note: GUPS' programming adheres to criteria and guidelines set forth by the Census Bureau for PUMAs. If any delineation steps violate these criteria and guidelines, GUPS will generate pop-up windows with information regarding the failure(s) and provide options to meet the established criteria and guidelines. Locate a copy of the criteria and guidelines document from the 2020 PUMA website for use during delineation.

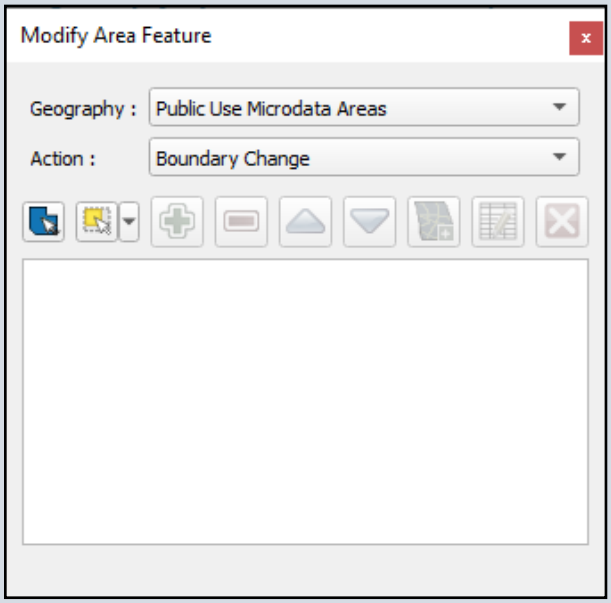
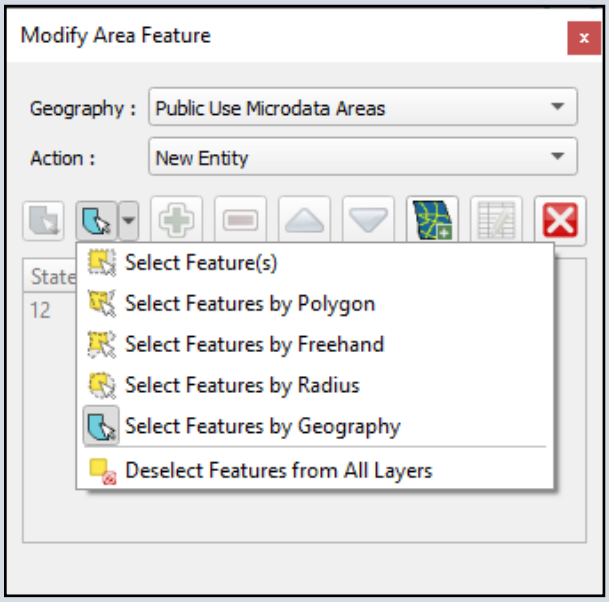
4.1 Delineate from a Blank Layer

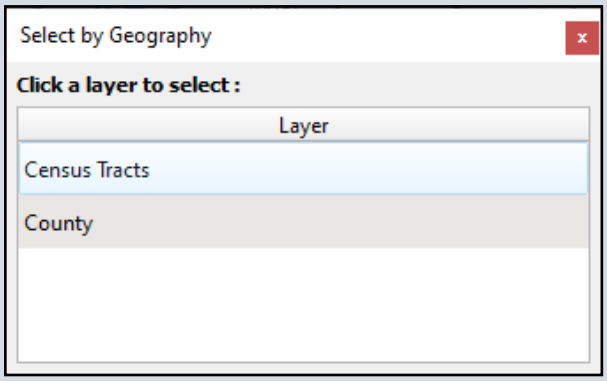
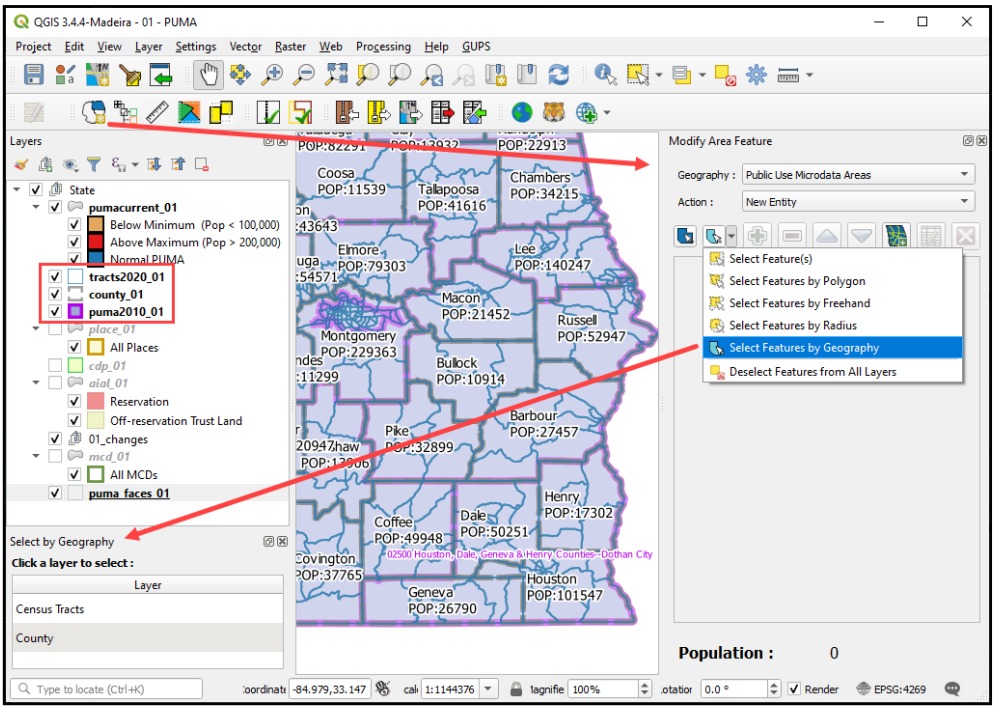
The Create a New Blank PUMA Layer option is used to interactively delineate PUMAs using census tracts and counties. This option populates a blank layer (e.g., the pumacurrent layer) in the PUMA project with the PUMA code and name. Review **Table 6** for the specifics on this delineation option.

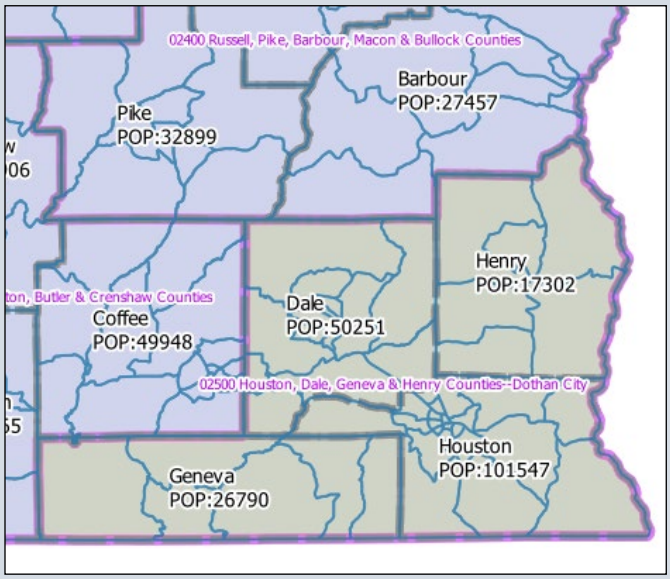
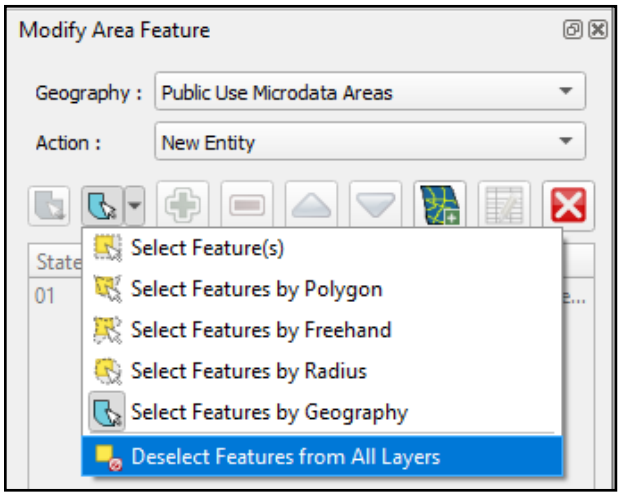
Note: If the state includes American Indian reservations (either federal or state legal reservations), check the "aial_01" layer in the Table of Contents. This will make the layer visible and assist with delineation by allowing for a visual inspection of reservations that may be split among more than one PUMA.

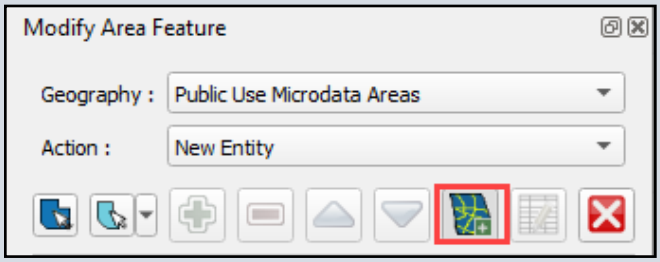
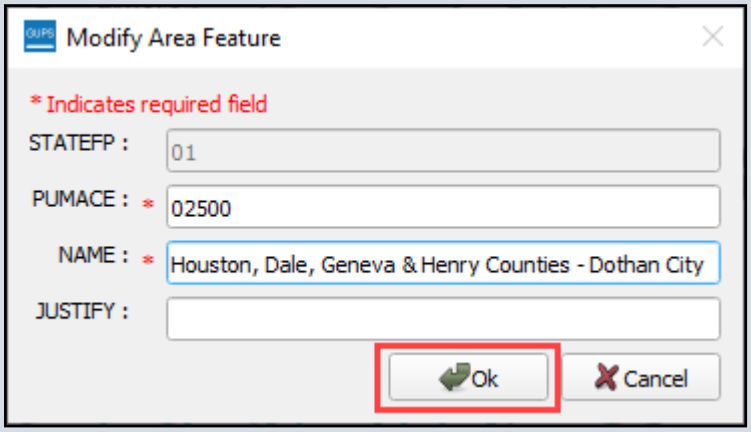
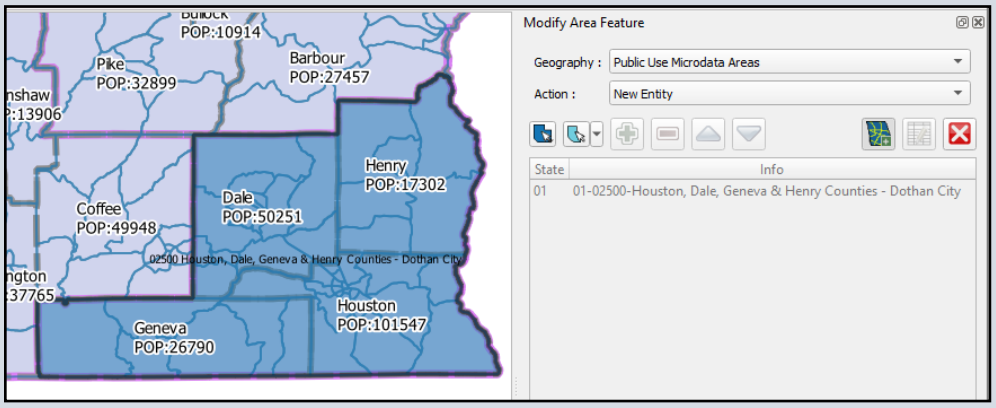
Table 6: Steps to Delineate PUMAs Using the Create a New Blank Layer Option

Step	Action and *Result(s)*
Step 1	With the steps in Table 3 complete and the PUMA project open, select the **Modify Area Feature** button from the **PUMA toolbar**. 

Step	Action and *Result(s)*
Step 2	*The **Modify Area Feature** window appears with the **Geography** field set to **Public Use Microdata Areas** and the **Action** field set to **Boundary Change**.*  To create PUMAs, change the **Action** field from **Boundary Change** to **New Entity** and expand the **Select Feature(s)** button to expose all the options for selection during delineation. 
	The Census Bureau recommends the **Select Features by Geography** option for PUMA delineation because it permits the selection of whole county or census tract, the building blocks of PUMAs. Other options for delineation are not described in this table. Their use is intuitive, but contact <geo.puma@census.gov> if questions arise on their use.

Step	Action and *Result(s)*
Step 3	*After the selection of **Select Features by Geography**, a **Select by Geography** window appears.* 
	Both the **Select by Geography** window and the **Modify Area Feature** window are floating windows that can be moved outside of the project window, across monitors, or docked within the PUMA project.  Beneficial layers to use for visual guidance during delineation include the tracts2020 layer, the county layer, and the puma2010 layer. All three layers are highlighted by red rectangle in the image above. To make them visible, select the box next to the layer name in the Table of Contents to add a checkmark. To hide their visibility, select the box again to remove the checkmark. If the state includes American Indian reservations or maintains unique relationships with places and minor civil divisions, those layers are available for reference as well. All three layers have scale dependent labels. The tracts2020 labels appear below the 1:50000 scale and label the tract number and its 2020 population. The county labels appear below the 1:1800000 scale and label the county name and 2020 population. The puma2010 labels appear below 1:2000000 scale and label the 2010 PUMA code and name.

Step	Action and *Result(s)*
Step 4	From the **Select by Geography** window, choose the layer to use for delineation and use the mouse to select the county(s) or census tracts to include in the PUMA. Use the **Shift** or **Ctrl** keys on the keyboard to select more than one county or census tract. *The selected geography appears in a different shade to show its selection.*  Both layers can be used for delineation within the same project. This feature is beneficial for counties that have multiple PUMAs. Selection of **County** activates the "puma_faces" layer in the Table of Contents while selection of **Census Tracts** activates the "tracts2020" layer.
	To deselect some of the selected features, use the **Shift** or **Ctrl** keys on the keyboard to choose the selected census tract or county. To deselect all features from the PUMA selection (i.e., county or census tract), use the **Deselect Features from All Layers** option from the **Select Feature(s)** button in the toolbar of the **Modify Area Feature** window.  This same button appears on the **Standard toolbar**, shown below. Both options work for deselecting. 

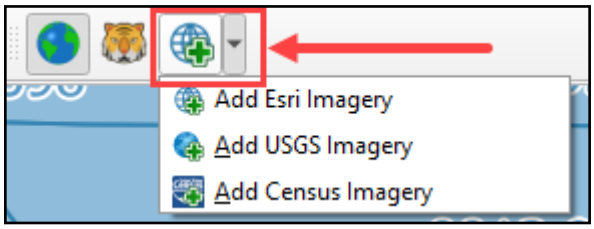
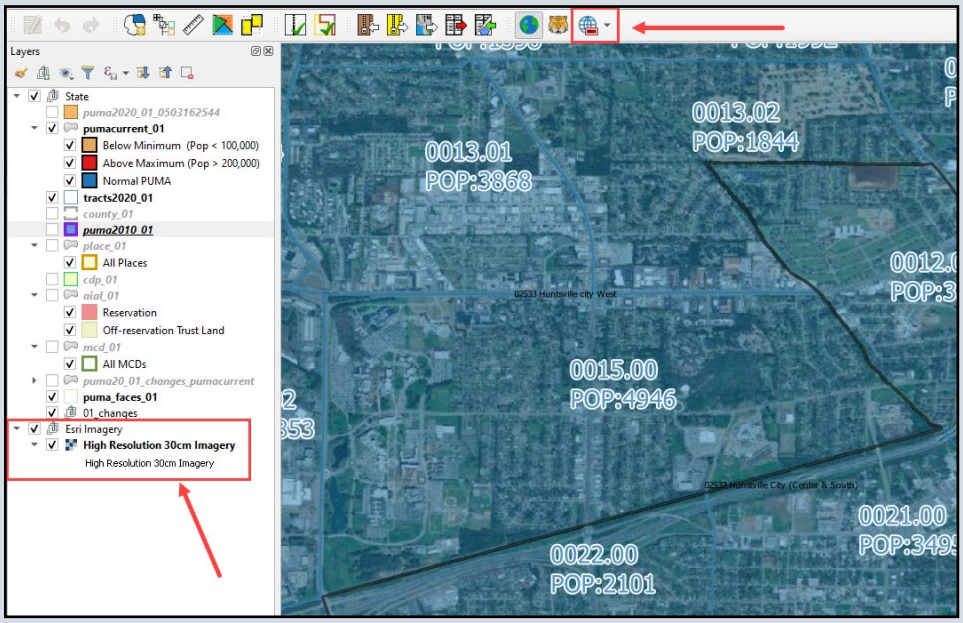
Step	Action and *Result(s)*
Step 5	With the selection(s) made, choose the **Add Entity** button from toolbar of the **Modify Area Feature** window.  *A secondary window appears to enter the PUMA code (PUMACE) and PUMA name (NAME).*  Choose **OK** to continue.
	The *2010 PUMA Names* file on the PUMA website may be helpful to use for copying/pasting if no changes are needed to the code or name. If the geography changed for 2020, use of the code or name from 2010 may not be applicable.
Step 6	Once added, *the new PUMA appears within the main **Modify Area Feature** window and in the **Map View***. 
Step 7	Continue to use the **New Entity** action and **Select Feature(s)** tools to delineate additional PUMAs and the **Add Entity** button to assign a code and name.

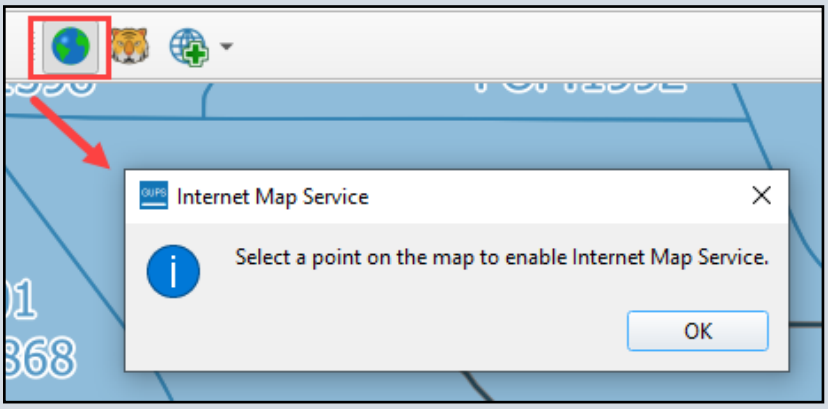
4.1.1 Add Imagery or Open an Internet Map Service

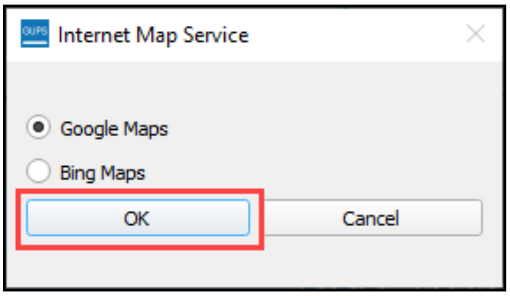
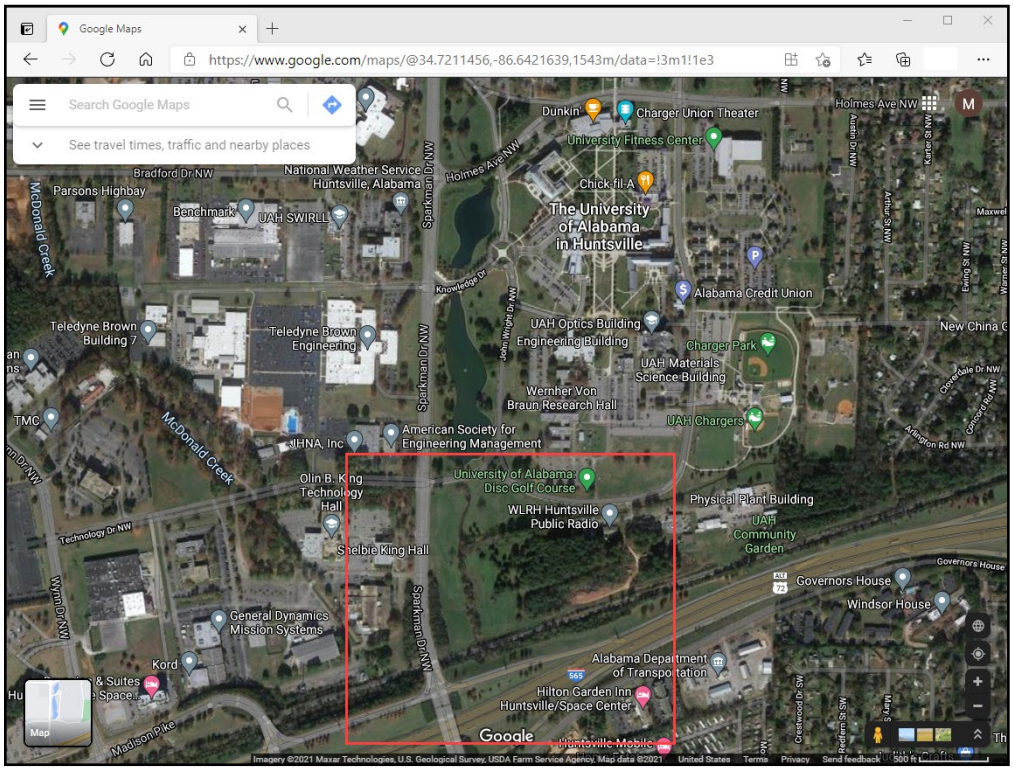
For PUMAs delineated by census tract(s), it may be useful to add imagery and/or open an internet map service to provide visual assistance with the delineation. The functionality described in **Table 7** may prove useful for all three delineation options.

IMPORTANT: Participants cannot change the boundary of census tracts as part of PUMA, nor add features to be used as PUMA boundaries. The purpose of the two tools described in this sub-section is to provide a visual reference for the census tract boundaries.

Table 7: Steps to Add Imagery or Open an Internet Map Service

Step	Action and *Result(s)*
Step 1	To add imagery, select the choices arrow adjacent to the **Add Imagery** button from the **PUMA toolbar** to expose the three options for imagery to add to the project.  Select the vintage of imagery to load into the project. Selecting the **Add Imagery** button instead of the choices arrow will open the first option, **Add Esri Imagery**.
Step 2	Once added, *the **Add Imagery** button changes from a green plus sign to a red negative sign and the imagery loads into the project as the last layer in the Table of Contents*. This allows the imagery to underlie the other layers. 
	The Census Bureau recommends turning off the imagery or removing it from the project prior to saving. This action allows GUPS to reopen the project successfully. To remove the imagery from the project, choose the **Add Imagery** button again (i.e., the red negative sign). To turn the imagery off from within the Table of Contents, select the checkmark next to the layer name.

Step	Action and *Result(s)*
Step 3	To open an internet map service, select the **Internet Map Service** button from the **PUMA toolbar**. *An **Internet Map Service** pop-up window appears that instructs the participant to select a point on the map to enable the Internet Map Service*.  Select **OK** to proceed with selecting a point in the Map View.
Step 4	Use the mouse to select a point in the Map View to open the map service. It is from this point that the map service will include in its view when it opens. 
	The image above is used to illustrate the general vicinity of the point selected by highlighting the area with a red rectangle. The red rectangle is not part of the selection process.

Step	Action and *Result(s)*
Step 5	Once a point is selected, the **Internet Map Service** window opens for the participant to choose either **Google Maps** or **Bing Maps**.  Select **OK** to proceed or **Cancel** to return to Map View. *Google Maps opens in an internet browser window to include the point selected from the Map View*. 

With these two tools described, proceed to the next sub-chapter for instructions to modify or delete a PUMA.

4.2 Modify or Delete a PUMA

As PUMAs are delineated, participants may find the need to modify their boundary, code, or name. For some, it may be easier to delete the PUMA and begin again. These three GUPS tasks are described in this sub-chapter.

If a change is needed to the boundary, code, or name of a delineated PUMA, ensure the Action field is set to Boundary Change and select a PUMA from the list of PUMAs that appear in the main Modify Area Feature window. As shown in **Figure 5**, the selected PUMA appears as a

darker color in the Map View and shows as selected in the main Modify Area Feature window for a participant to confirm they have selected the correct PUMA to modify.

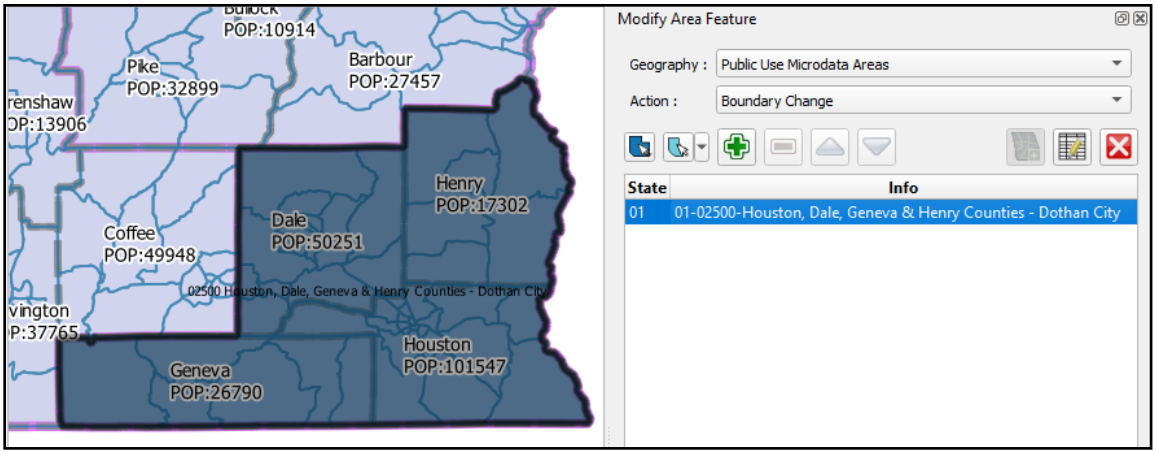


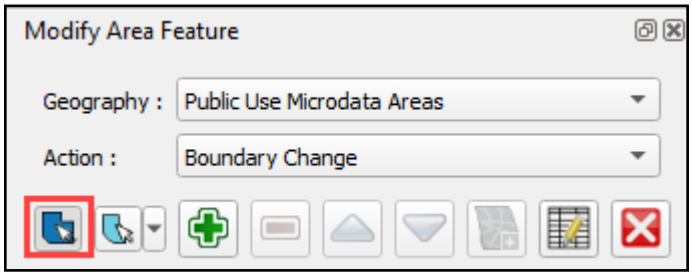
Figure 5: Example of a Selected PUMA in the Map View and Modify Area Feature Window

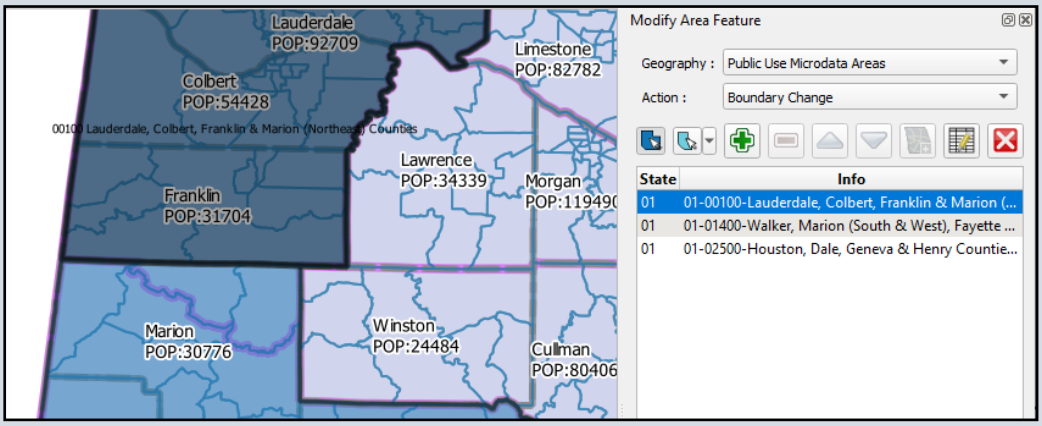
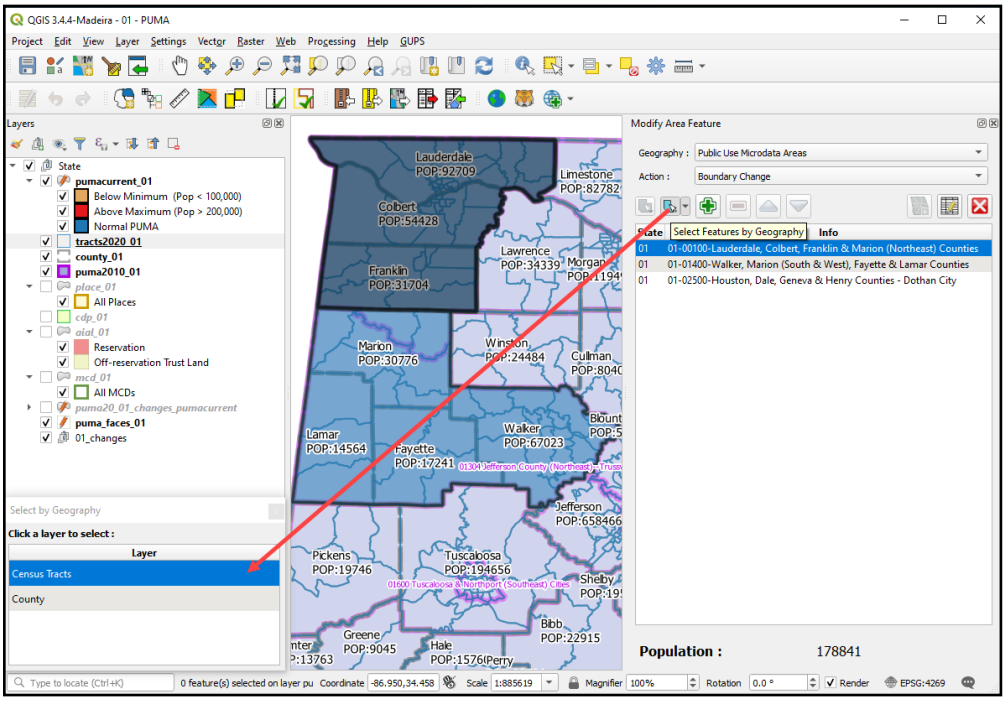
4.2.1 Modify a PUMA Boundary

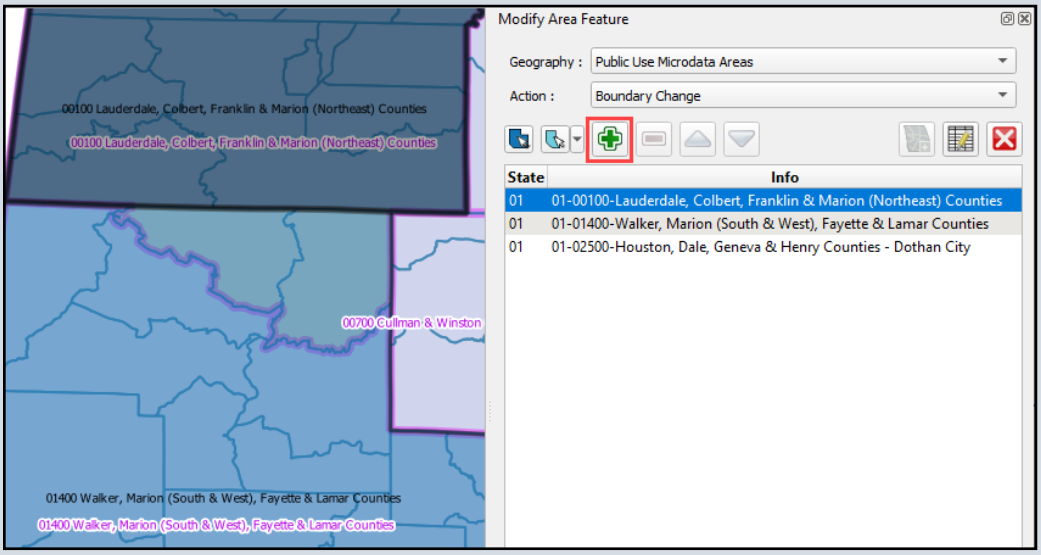
Participants must use the Add Area button to add area to another delineated PUMA rather than removing area from a delineated PUMA. In other words, a boundary, more specifically an area (county or census tract), must have a PUMA to be modified into, not removed from. For example, in **Figure 5** a participant could not remove Geneva County from PUMA 02500 because there is no other PUMA to assign to Geneva County. To modify the boundary of the PUMA, follow the steps in **Table 8**.

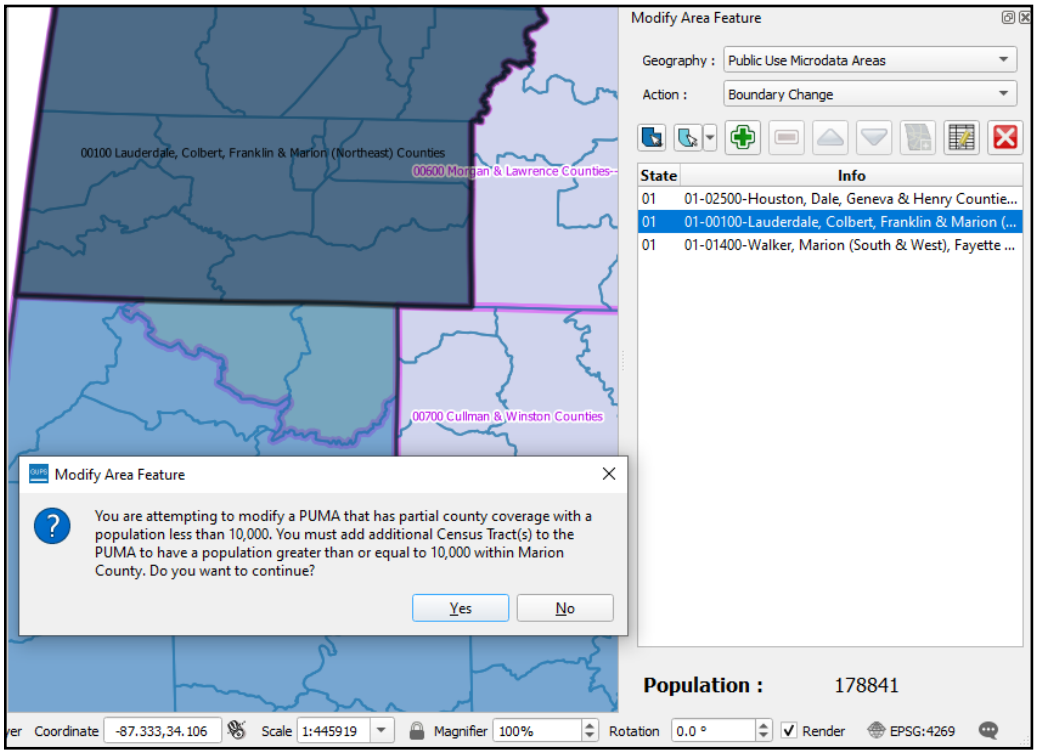
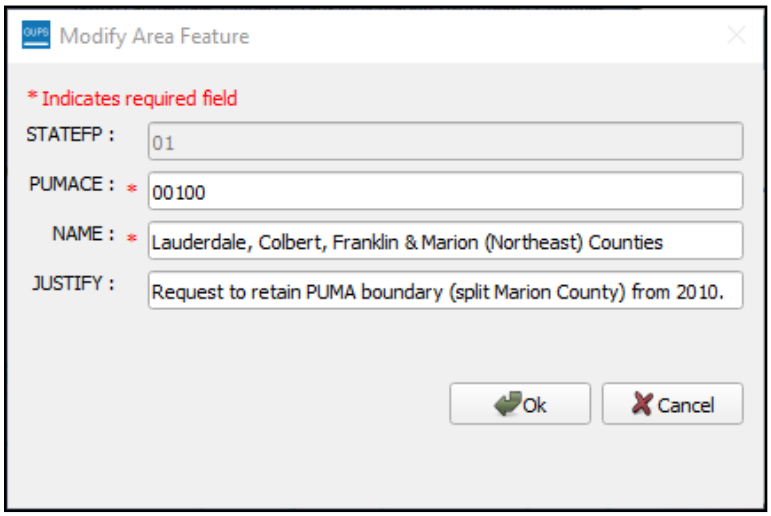
Note: The Remove Area button appears as a grayed-out negative (-) sign to the right of the Add Area button on the Modify Area Feature window toolbar, but does not activate for the 2020 PUMA.

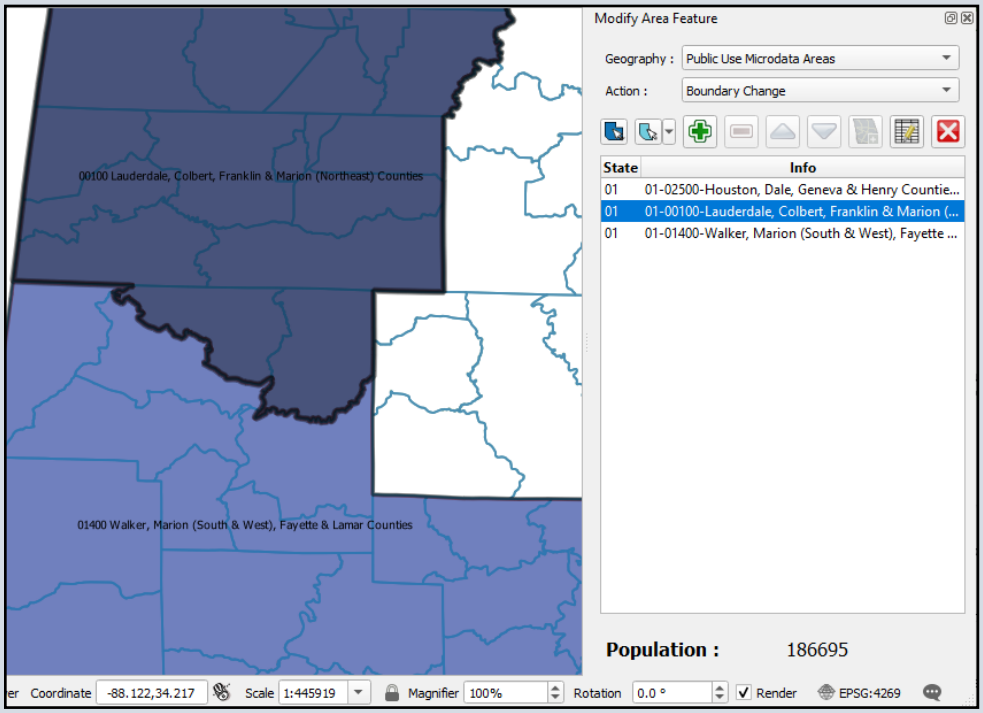
Table 8: Steps to Modify a PUMA Boundary

Step	Action and *Result(s)*
Step 1	Select the PUMA to modify from the list of PUMAs in the **Modify Area Feature** window or by choosing the **Select Target Area** button from the **Modify Area Features toolbar**. The latter permits the interactive selection of the PUMA from the **Map View** rather than from the list of PUMAs that appear in the **Modify Area Feature** window. 

Step	Action and *Result(s)*
Step 2	After choosing the **Select Target Area** button, a crosshair appears for the mouse cursor. With the mouse, select the PUMA to modify in the **Map View**. *The selected PUMA highlights in the PUMA list and in the Map View*. 
Step 3	Activate the **Select Features by Geography** window to open the **Select by Geography** window and select either **Census Tracts** or **County**.  In this example, since we want to modify the boundary of PUMA 00100 to include two census tracts in northeast Marion County, choose **Census Tracts**.

Step	Action and *Result(s)*
Step 4	Use the mouse to select the two census tracts currently assigned to PUMA 01400 in northeast Marion County (as highlighted from the 2010 PUMA by a pink border). Once selected, choose the **Add Area** button from the toolbar in the **Modify Area Feature** window to add the census tracts to PUMA 00100. 

Step	Action and *Result(s)*
Step 5	*The resulting modification produces a warning message for partial county coverage*. Choose **Yes** to continue or **No** to close the window and cancel the modification.  In this example, the two census tracts have a population less than 10,000. Because these two census tracts were in PUMA 00100 for 2010, the Census Bureau will allow the retention of this split county PUMA if a justification is supplied during the criteria review. Otherwise, participants must add additional census tracts to attain or surpass the 10,000-population requirement (new requirement for 2020). Rather than waiting to run the PUMA criteria review tool, a justification can be supplied as part of the **Change Attributes** button functionality described in greater detail in the next section. 

Step	Action and *Result(s)*
Step 6	Once complete, the new boundary appears in the project and the population for the PUMA updates (i.e., from 178,841 to 186,695). 

With the modification of a boundary presented, proceed to the next sub-section to learn about modifying the PUMA code and/or name.

4.2.2 Modify a PUMA Code and/or Name

IMPORTANT: Refer to the *2020 PUMA Coding Guidelines* and *2020 PUMA Naming Guidelines* documents located on the 2020 PUMA website for details.

Follow steps 1 and 2 from **Table 8** to select the PUMA to modify. To modify the code or name of the PUMA, choose the Change Attributes button, as shown in **Figure 6**, from the toolbar in the Modify Area Feature window. A secondary Modify Area Feature window appears to change attribution for the code or name of the selected PUMA.

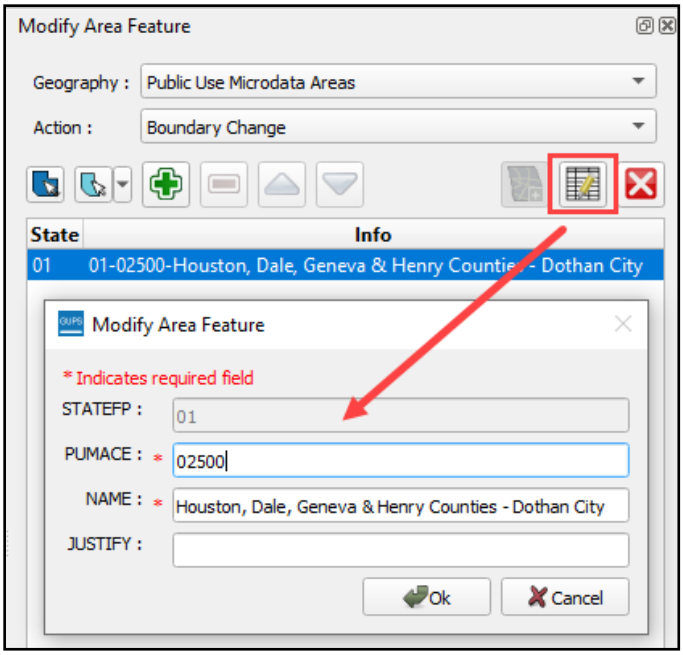


Figure 6: Example of Modifying the Attributes of a PUMA

Edit the code in the PUMACE field and/or the name in the NAME field. Choose OK or Cancel to close the secondary window and return to the previous menu. Save the project using the Save Project button on the Standard toolbar or the Save option beneath the Project tab on the Menu bar.

Note: A justification can be supplied in the **JUSTIFY** field within this window to explain issues with the PUMA that may involve criteria, naming, size, etc. Supplying a justification at this stage will prevent PUMAs that otherwise fail criteria from showing after running the PUMA Criteria Review tool.

4.2.3 Delete a PUMA

Follow steps 1 and 2 from **Table 8** to select the PUMA to delete. To delete the PUMA in its entirety, choose the Delete Area Feature button, as shown in **Figure 7**, from the toolbar in the Modify Area Feature window.

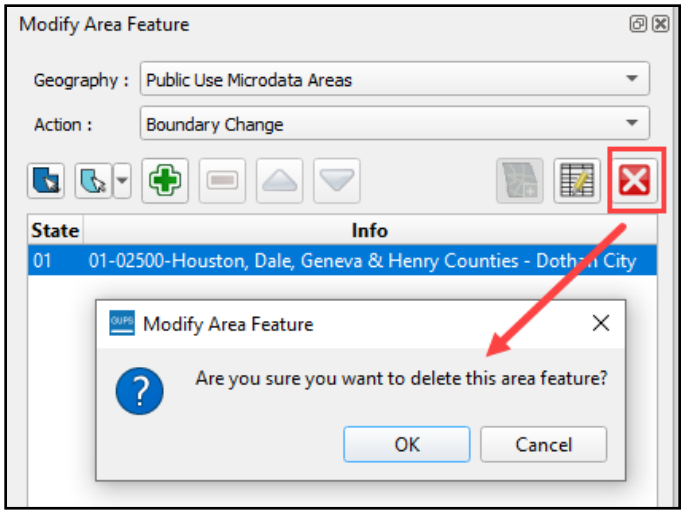


Figure 7: Example of Deleting a PUMA

A Modify Area Feature confirmation window appears to confirm or cancel deletion of the selected PUMA. To delete, choose OK or Cancel to close the confirmation window and return to the previous menu. Save the project using the Save Project button on the Standard toolbar or the Save option beneath the Project tab on the Menu bar.

Note: Participants do not delete a portion of a PUMA. If an area (census tract and/or county) has been assigned to a PUMA incorrectly, it must be reassigned through the Boundary Change action as described in sub-section **4.2.1**, not deleted or removed from an existing PUMA.

4.3 Export PUMA Delineations

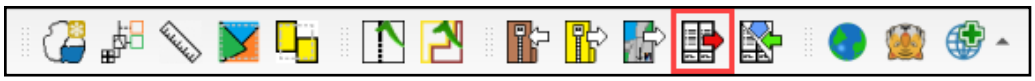
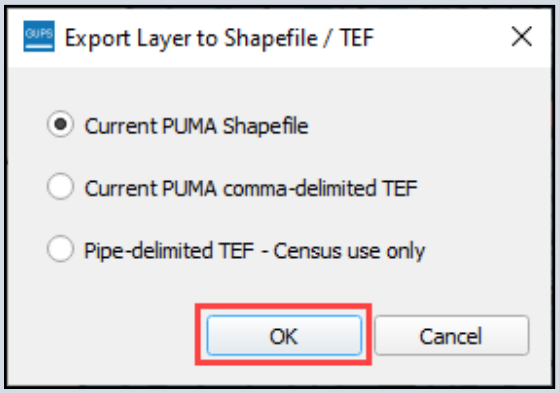
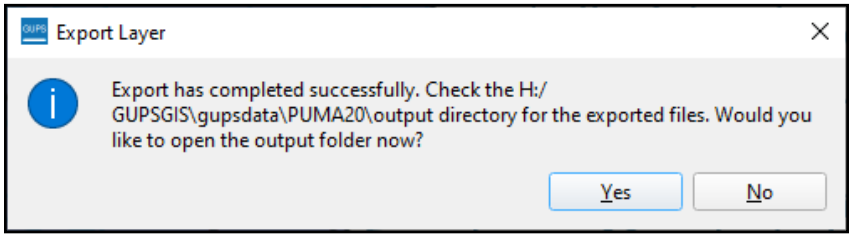
As participants complete their delineation work, they may need or want to export their work to create a shapefile or a tabular equivalency file (TEF). For example, interested data users who are assisting their SDCs with delineation may only be delineating a portion of the state and may need to provide their work to their SDC for inclusion in the state's PUMA project. They use the export options described in this sub-chapter to generate their files to share with their SDC. SDCs receiving files from interested data users must define for interested data user how they wish to receive these exported files (e.g., email, secure FTP, or other manner).

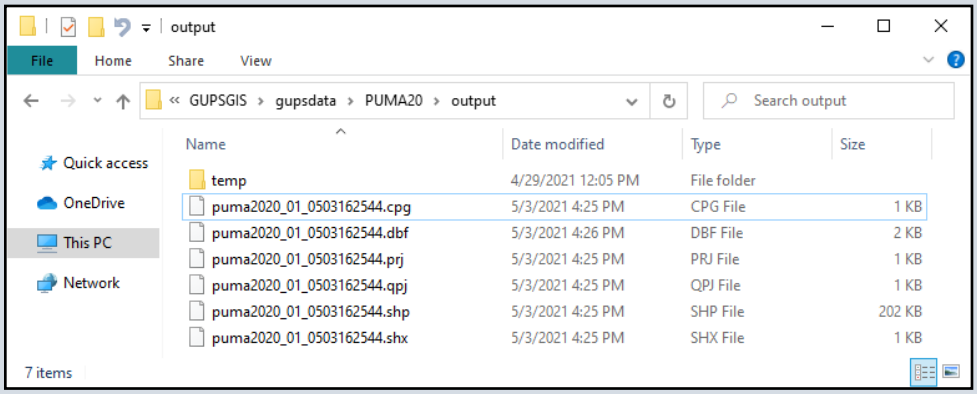
Upon completion of all delineation work, and separate from their submission to the Census Bureau, SDCs are encouraged to closely review their proposed delineations. To do so, SDCs may generate a shapefile of the proposed PUMA geography with the PUMA codes and names or create a text file (i.e., a TEF) of census tracts with the PUMA codes and names for their state. Review the next sub-section for instructions on exporting the delineations to a shapefile. Skip to sub-section **4.3.2** for instructions on exporting the delineations to a TEF.

4.3.1 Export to a Shapefile

To export the delineations to a shapefile, follow the steps described in **Table 9** below.

Table 9: Steps to Export PUMAs to a Shapefile

Step	Action and *Result(s)*
Step 1	Select the **Export Layer to Shapefile/TEF** button from the **PUMA toolbar**. 
Step 2	From the **Export Layer to Shapefile/TEF** window that appears, choose **Current PUMA Shapefile**.  Select **OK** to proceed or **Cancel** to return to the Map View.
Step 3	When the export completes, *an **Export Layer** confirmation window appears that lists the location of the exported file and a question to open the output folder*.  Select **Yes** to open the output folder or **No** to close the window.

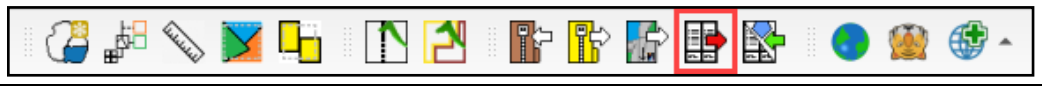
Step	Action and *Result(s)*
Step 4	The selection of **Yes** *opens the GUPSGIS/gupsdata/PUMA20/output folder where the puma2020 shapefile is located*.  The file name is comprised of the program name (puma2020), the state FIPS code (01), the month (05), date (03), hours (16, or 4pm), minutes (25), and seconds (44) in the form of a military timestamp (e.g., puma2020_01_0503162544).
	The shapefile (and all its components) of PUMAs contains PUMA codes and PUMA names can be shared with SDCs as they prepare the whole state's delineations. SDCs may also choose to export the whole state once all delineation work is complete.

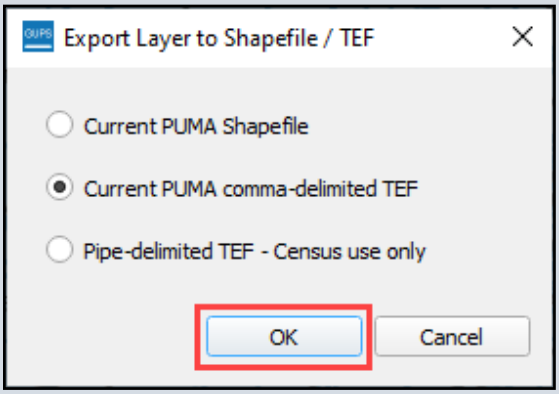
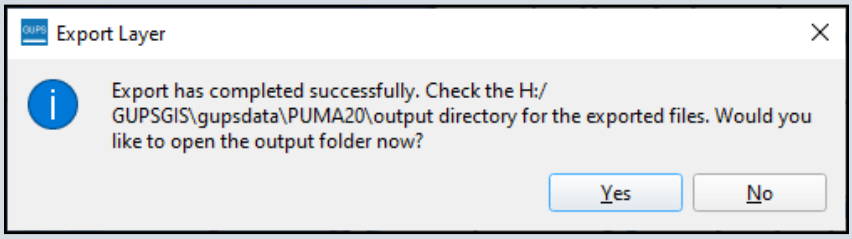
Skip to sub-chapter **4.4** for instructions to import this shapefile into a PUMA project or to sub-section **4.4.1** to add this shapefile as a reference to an existing PUMA project. Review the next sub-section for instructions on exporting the delineations to a tabular equivalency file.

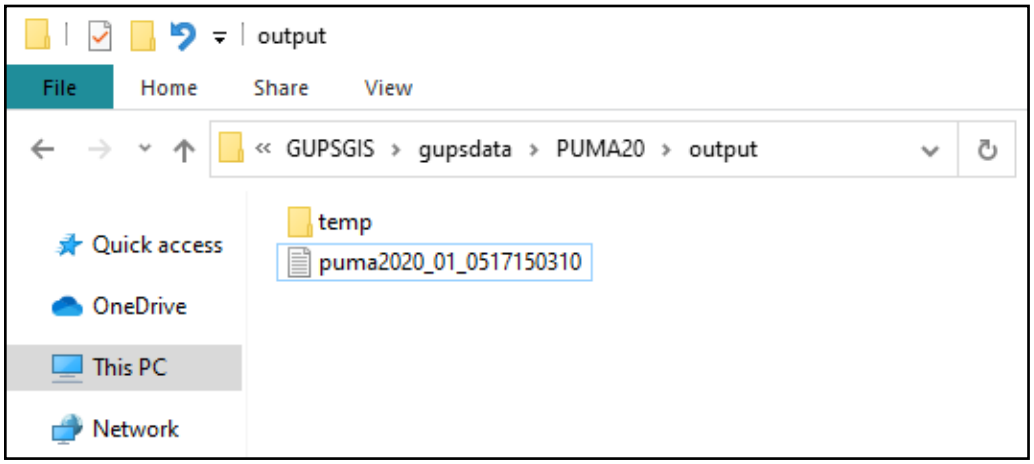
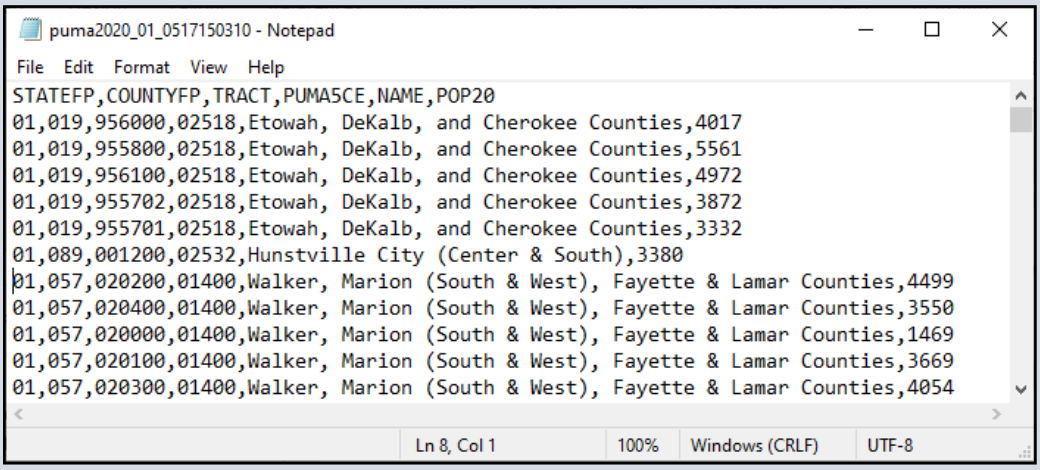
4.3.2 Export to a Tabular Equivalency File

To export the delineations to a tabular equivalency text file, follow the steps in **Table 10**.

Table 10: Steps to Export PUMAs to a Tabular Equivalency File

Step	Action and *Result(s)*
Step 1	Select the **Export Layer to Shapefile/TEF** button from the **PUMA toolbar**. 

Step	Action and *Result(s)*
Step 2	From the **Export Layer to Shapefile/TEF** window that appears, choose **Current PUMA comma delimited TEF.**  Select **OK** to proceed or **Cancel** to return to the Map View.
	GUPS only imports comma-delimited files. The final export option shown above is used by the Census Bureau during their processing of submissions and is not used by participants that intend to use GUPS to import a TEF.
Step 3	When the export completes, *an **Export Layer** confirmation window appears that lists the location of the exported file and a question to open the output folder.*  Select **Yes** to open the output folder or **No** to close the window.

Step	Action and *Result(s)*
Step 4	The selection of **Yes** *opens the GUPSGIS/gupsdata/PUMA20/output folder where the puma2020 tabular equivalency file (.txt) is located*.  The file name is comprised of the (puma2020), the state FIPS code (01), the month (05), date (17), hours (15, or 3pm), minutes (03), and seconds (10) in the form of a military timestamp (e.g., puma2020_01_0517150310).
Step 5	To view the file properly, open in Notepad or WordPad. 
	This text file of census tracts, PUMA codes, and PUMA names can be shared with SDCs as they prepare the whole state's delineations. Additionally, SDCs may also choose to export the whole state once all delineation work is complete.

Skip sub-chapter **4.5** to import this TEF into a PUMA project. Review the next sub-section for instructions on exporting the entire PUMA project to share with another participant.

4.3.3 Export to Share Entire PUMA Project

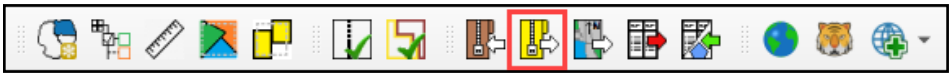
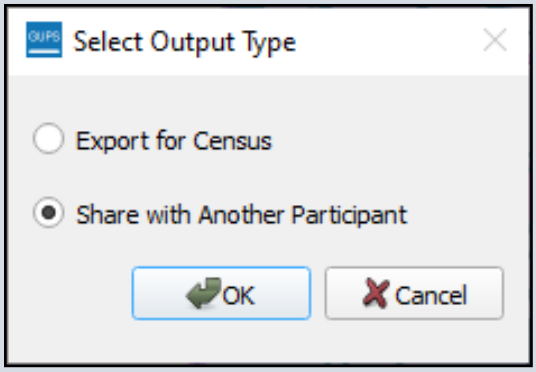
For participants that wish to share their PUMA project with others, perhaps their supervisor or other colleagues in their office or with the SDC, they may use Export to Zip – Share with Another Participant. When used, the entire project is organized and zipped for importing into another GUPS session. Exporting the entire GUPS project permits another person to review the delineations prior to finalizing them for submission. Often staff in the same office use this tool

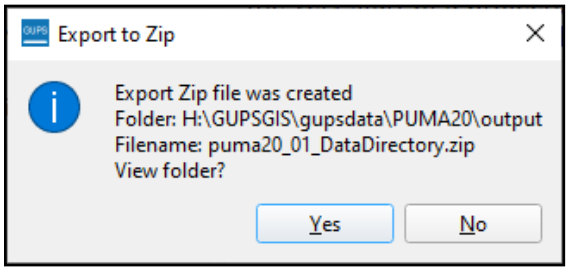
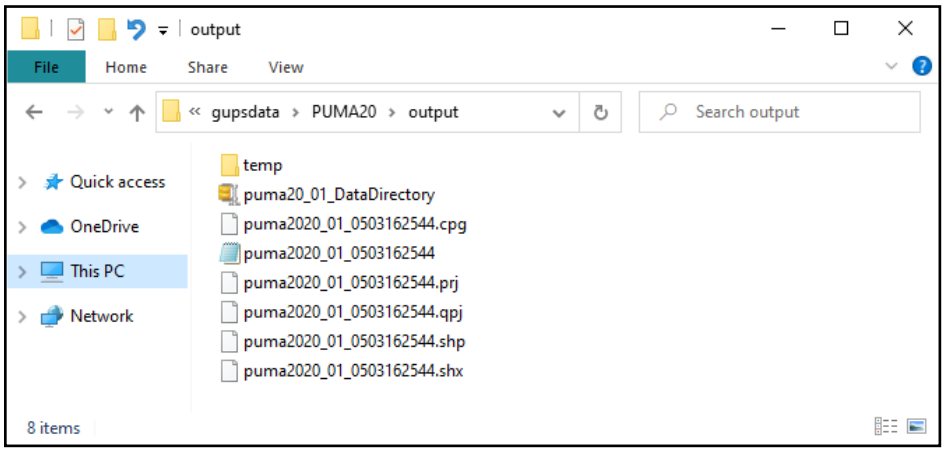
as a mechanism to conduct their own review of the work performed by another person. Depending on the size of the state and number of PUMAs, this can be a lengthy, time-consuming export task.

Refer to **Table 11** for instructions on completing this task.

Note: This exported file cannot be used in conjunction with an existing PUMA project for reference. It becomes the PUMA project when imported.

Table 11: Steps to Export the PUMA Project to Share with Another Participant

Step	Action and *Result(s)*
Step 1	With the PUMA project open, select the **Export to Zip** button on the **PUMA toolbar**. 
Step 2	*The Select Output Type window appears.* Select the **Share with Another Participant** option.  Choose the **OK** button to continue. Be patient. The export process takes time to prepare the file.

Step	Action and *Result(s)*
Step 3	*Once complete, an **Export to Zip** window appears with the folder location and file name information.*  To open the folder, choose **Yes** or choose **No** to return to the PUMA project.  The “puma20_ST_DataDirectory.zip” file is the resulting exported .zip file, where the ST is the two-digit state FIPS code. This example is for Alabama, so “01” is the number that appears in the file name.
	Do not change the file name as GUPS can only import .zip files with this name, exported using GUPS. Share this .zip file of the PUMA project with others through email or other method of data sharing.

For instructions to import this .zip file into a blank PUMA project, skip to sub-section **4.4.2**. Otherwise, proceed to the next sub-chapter to learn more about delineating PUMAs using a shapefiles.

Note: The next two sub-chapter (e.g. 4.4 and 4.5) provide the instructions for importing the shapefile and tabular equivalency file generated from GUPS; however, the functionality of the Import tool can be used to import shapefiles or text files generated outside of GUPS if they meet the anticipated requirements. The Census Bureau does not provide instructions for creating files outside of GUPS, other than to provide the instruction of vintage of data (e.g., 2021 Partnership shapefiles version 1) to use and what attributes are required for successful import of the files into GUPS. The attributes for each file type are listed in the respective sub-chapter below.

4.4 Delineate from a Shapefile

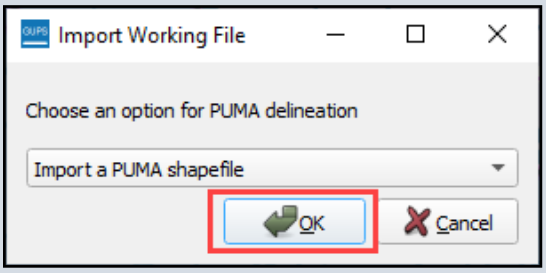
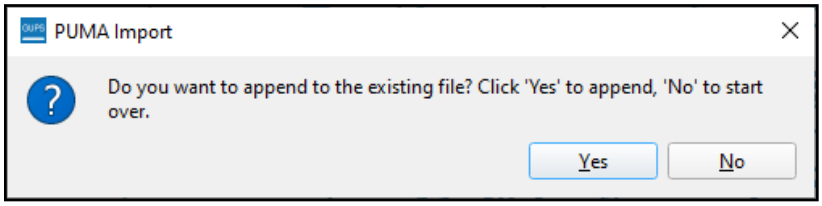
This sub-chapter is written from the perspective of a SDC who has received delineation assistance from other interested data users and needs to import their work; however, other participants may use this option for PUMA delineation. One example of this situation may be a Council of Governments that is working with a major city to delineate PUMAs within their city. The city may wish to provide an exported shapefile to the Council of Governments. The procedures described in the table below remain the same regardless of who is using the tool.

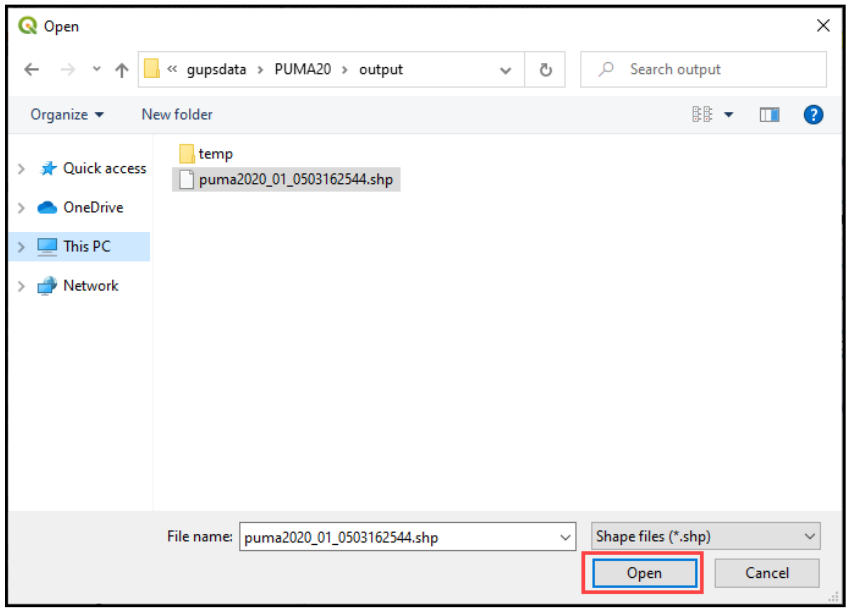
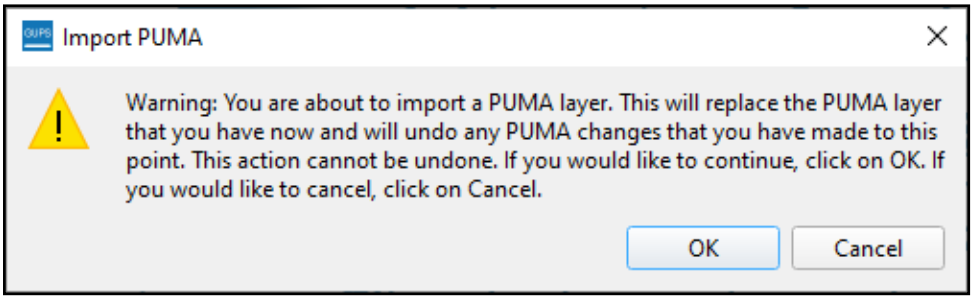
Participants that exported their delineation work from GUPS as a shapefile using the Export Layer to Shapefile/TEF button or those that created their PUMAs in their own GIS may provide their shapefile to the SDC for consideration and inclusion in the state's PUMA project. SDCs use the Import Working File button from the PUMA toolbar to import the work from others into their PUMA project.

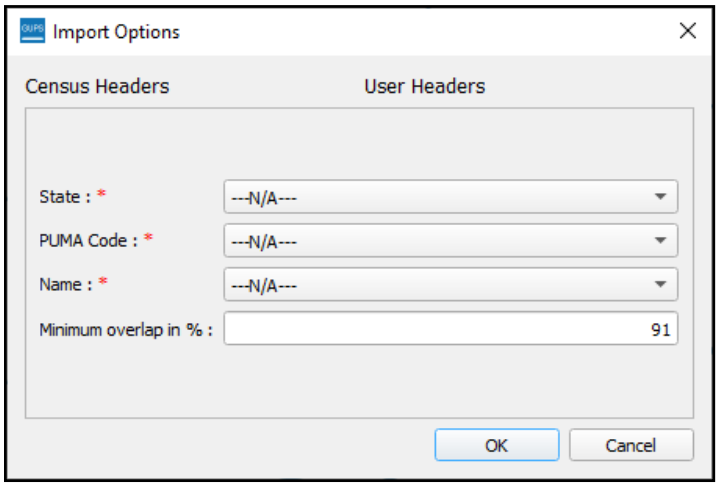
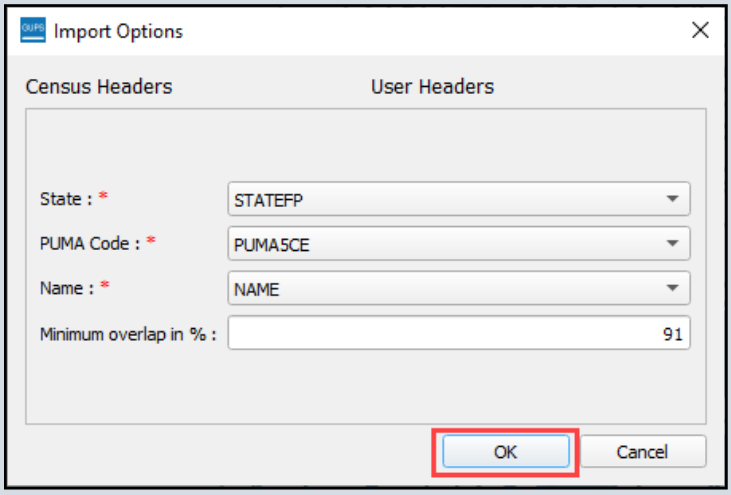
SDCs are encouraged to conduct a review the PUMA shapefiles they receive prior to importing them directly into their state's PUMA project. This likely will minimize import failures and prevent unnecessary edits or corrections to the PUMA project. For instructions on adding the shapefiles as a reference, skip to sub-section **4.4.1**. Once shapefiles are reviewed and deemed acceptable, review the information in **Table 12**.

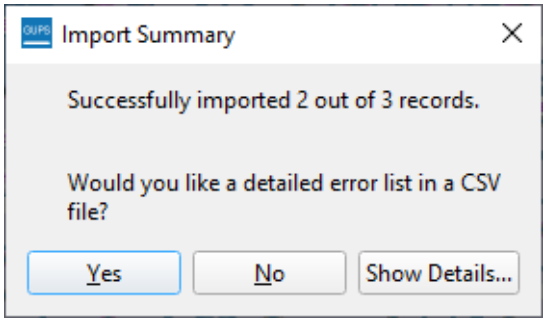
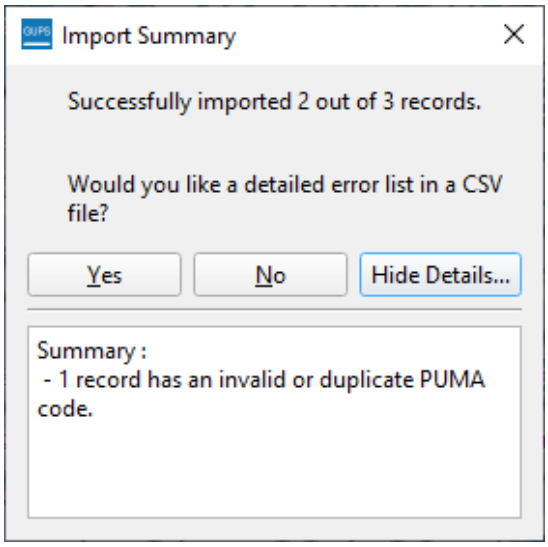
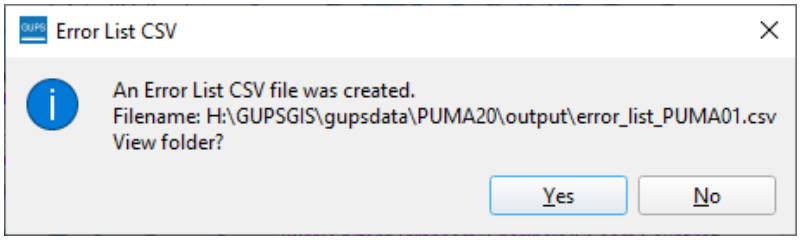
IMPORTANT:	Participants that wish to use their own GIS must use the 2021 Partnership shapefiles that have been updated to include the 2020 Census population numbers (POP20 attribute) within the state-based census tract layer (i.e., tracts2020). To confirm use of the correct version, these files will include "PVS_21_v1" in their file name and have an updated date stamp from September 2021. The shapefile of PUMAs must include fields for the two-digit state FIPS code, the five-digit PUMA code, and a PUMA name (maximum of 85-characters). Except for the PUMA name field, all other fields must not omit leading or trailing zeros from their coding.

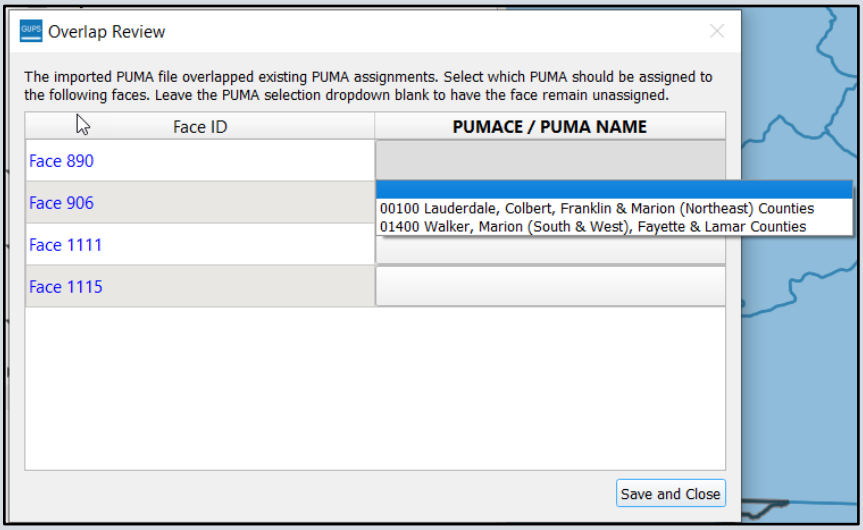
Table 12: Steps to Import a PUMA Shapefile

Step	Action and *Result(s)*
Step 1	With the state's PUMA project open in GUPS, select the **Import Working File** button from the **PUMA toolbar**. 
Step 2	*The **Import Working File** window opens*. Choose **Import a PUMA shapefile** from the drop-down menu of options.  Select **OK** to continue or **Cancel** to close the window.
Step 3	*The **PUMA Import** confirmation window appears*. Choose **Yes** to append the shapefile to the existing PUMA project or **No** to replace the existing project. 
	Choosing **No** will delete all previously saved delineation work in the existing project.

Step	Action and *Result(s)*
Step 4	*With the selection of **Yes**, a window opens for the selection of the shapefile*. This example uses the shapefile created in **Table 9**.  Depending how the shapefile was created, the file can be in a variety of locally managed directories/folders. The **output** folder shown in this location is the default location for files exported from GUPS using the **Export Layer to Shapefile/TEF** button. *With the selection of **No**, a warning window appears seeking confirmation for the replacement of the existing delineations*.  Select **OK** to continue and navigate to the file location as shown above or **Cancel** to return to the Map View.
	There is no restoration of any work in the existing PUMA project once **OK** is selected.

Step	Action and *Result(s)*
Step 5	*Once the file is chosen, an **Import Option** window appears.*  This window is used to select the fields in the shapefile that correspond to the three required fields in the PUMA project to achieve a successful import. The minimum overlap field defaults to 91%. Do not change this percentage.
Step 6	After the selection of the fields, choose the **OK** button to proceed or **Cancel** to close the window and begin again. 

Step	Action and *Result(s)*
	If an error(s) occurs with the import process, an **Import Summary** window appears with information about the problematic records.  To see more details about the error(s), select the **Show Details** button to expand the window.  To show less details, select the **Hide Details** button. Select the **Yes** button to generate a .csv file of the error(s) or select the **No** button to close the window without generating the file. This file is useful to discover more about the error(s) since they are not imported into the project.  The errant PUMAs do not import into GUPS. If multiple errors occurred a participant might wish to correct the shapefile and reimport instead of making the updates using GUPS.

Step	Action and *Result(s)*
	Additionally, if an overlap occurs for a face, the **Overlap Review** window appears to allow the participant to interactively assign the correct PUMA. 
Step 7	To work interactively in GUPS to add the PUMAs that were not imported from the shapefile, select the **Modify Area Feature** button from the **PUMA toolbar** and follow the steps described in sub-chapter **4.2**
Step 8	Save the project using the **Save Project** button on the **Standard toolbar** or the **Save** option beneath the **Project** tab on the **Menu bar**.

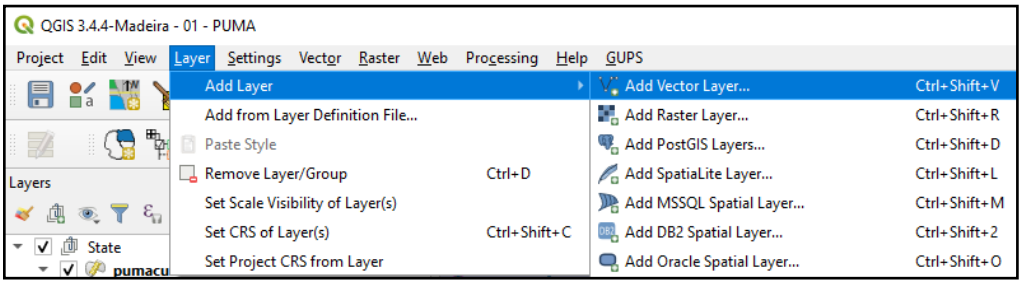
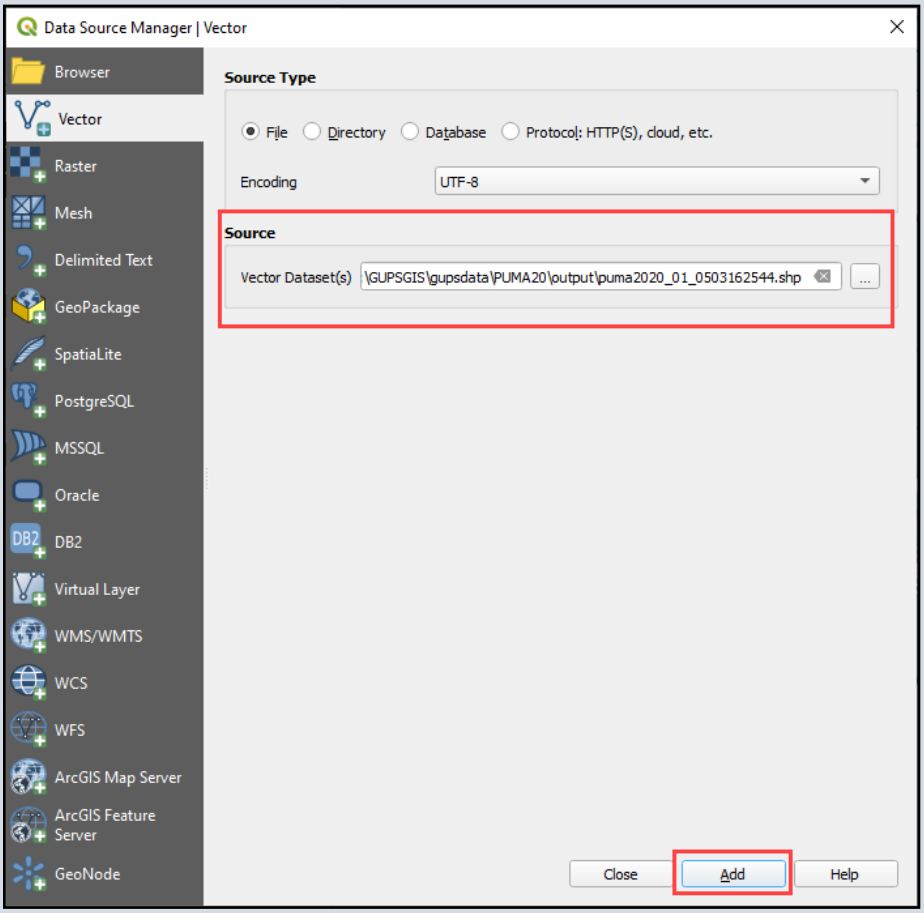
If the delineation work for the state is complete, proceed to **Chapter 5** for guidance on performing quality checks and criteria review. If delineation work remains, continue delineating interactively in GUPS by using the Modify Area Feature button, or by importing additional shapefiles or PUMA tabular equivalency files, as described in the sub-chapter **4.5**.

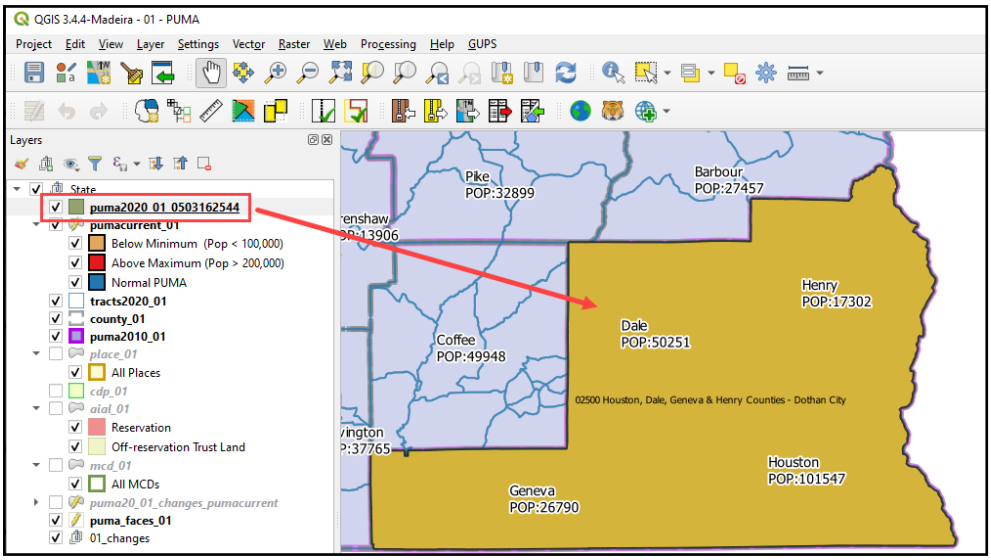
4.4.1 Add a PUMA Shapefile as a Layer for Reference

As mentioned in the beginning of this sub-chapter, prior to importing a PUMA shapefile into the project and appending or overwriting existing delineation work, SDCs (or other participants that are sharing files) may wish to add a PUMA shapefile as a layer for reference. This action may apply to participants that generated PUMAs using their own GIS or to those that may want to review multiple delineation proposals for an area. Refer to the steps described in **Table 13** for instructions on adding a PUMA shapefile as a reference layer.

Note: Use these same steps outlined below to add other reference layers (e.g., a shapefile of the state's regional planning district/council of government boundaries, a locally generated shapefile of roads, a locally generated shapefile of PUMAs using the 2010 census tracts, etc.) that may be helpful during delineation.

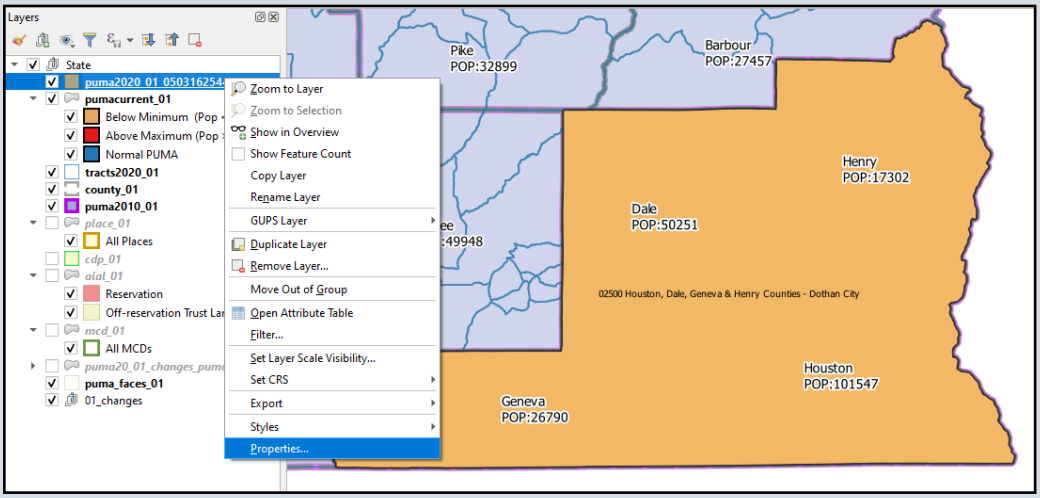
Table 13: Steps to Add a PUMA Shapefile for Reference

Step	Action and *Result(s)*
Step 1	With the state's PUMA project open in GUPS, select **Layer → Add Layer → Add Vector Layer** from the **Menu bar**. 
Step 2	*A **Data Source Manager | Vector** window appears.*  Navigate to the folder where the PUMA shapefile is located to add as a reference in the **Source** field and select **Add**.

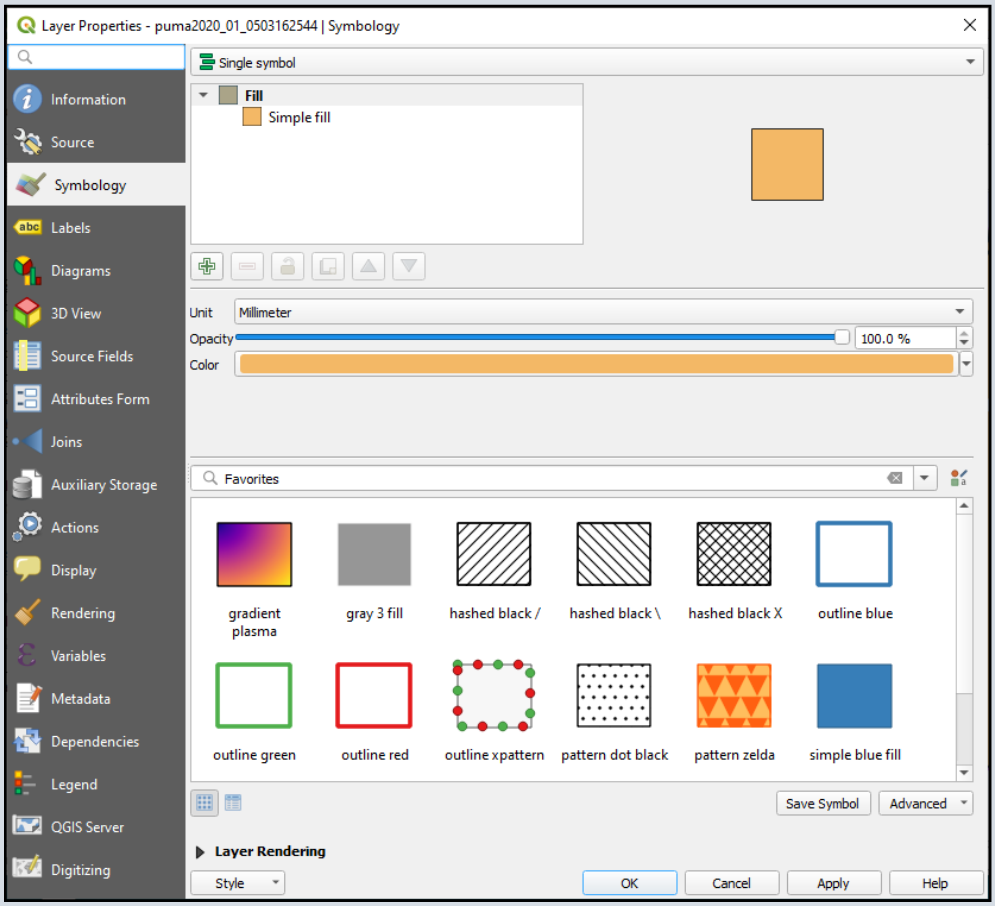
Step	Action and *Result(s)*
Step 3	*The shapefile is added to the PUMA project and displays in the Map View.*  The layer's placement in the Table of Contents will affect how it overlays with the other layers in the project. In this example, the added layer is the first/top layer, so it overlays all the other layers present in the project.

Step	Action and *Result(s)*

Participants can modify the properties of the layer by selecting the layer in the Table of Contents and using the right mouse button to open Properties for the layer.



*This opens the **Layer Properties** window.* Within this window modifications can be made to various default properties set for the added layer.



Participants may also “drag and drop” the layer into a different location within the Table of Contents to change the placement of the layer within the project. These visibility tips and others are described in further detail within sub-appendix **C3**.

Return to **Table 12** for instructions on importing a shapefile into the PUMA project.

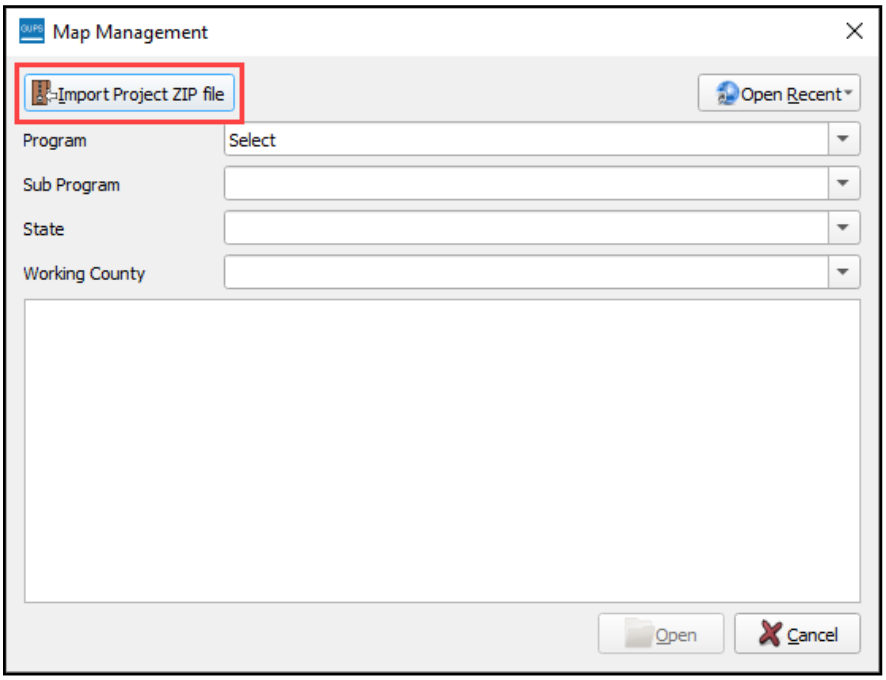
4.4.2 Import a State's PUMA Project

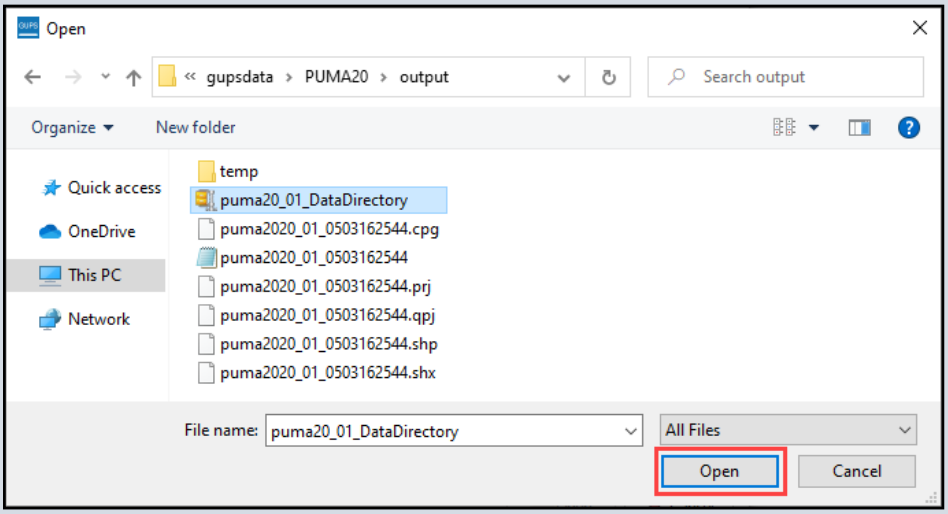
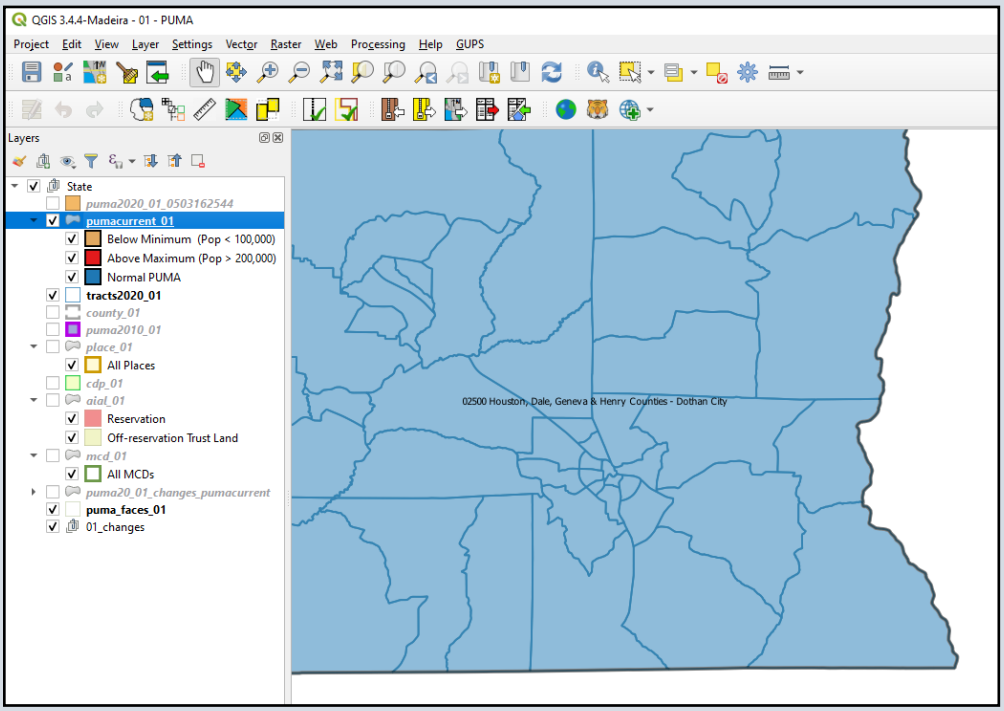
As outlined in sub-section **4.3.3**, participants can import an entire PUMA project exported from GUPS as a means of reviewing or performing their own quality checks on the delineation work. This functionality may assist supervisors in reviewing work performed by their staff, or it may be used by SDCs to import a completed project to serve as the state's submission.

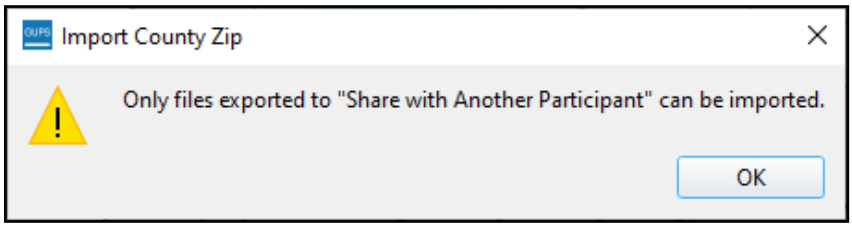
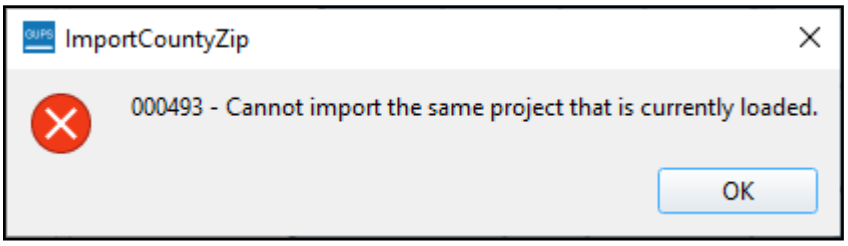
The Census Bureau recommends participants clean their project or PUMA program from GUPS if any work has been completed for the state. This ensures a successful import. Review **Appendix E** for instructions on using the Clean button from the Standard toolbar.

Follow the steps in **Table 14** for instructions on importing a state's PUMA project.

Table 14: Steps to Import a State PUMA Project for Reference

Step	Action and *Result(s)*
Step 1	Open in GUPS, choose the **Import Project ZIP file** button from the **Map Management** window. 

Step	Action and *Result(s)*
Step 2	Navigate to the folder from step 3 in **Table 11** and select the .zip file with "DataDirectory" as part of its file name.  Select **Open** to proceed or **Cancel** to return to the Map View.
	Other files may exist within the **output** folder, but this tool only imports the .zip file exported from GUPS using the **Export to Zip – Share with Another Participant** tool, with the specific file name.
Step 3	*Once imported, the Table of Contents is populated with the layers from the exported .zip file and the Map View is symbolized accordingly.*  The project will open to the exact scale and position the Map View was in during export. The participant can proceed with reviewing the delineations and making modifications as needed using the **Modify Area Feature** tool described earlier in sub-chapter **4.2**.

Step	Action and *Result(s)*
	As a reminder, GUPS only imports .zip files that are exported from its software using **Export to Zip – Share with Another Participant.** If a participant changes the default file name of the exported file or attempts to import other shapefiles, *the following error message appears.*  Additionally, a participant cannot import a shared .zip file into a project that is open. *If so, the following error message appears*.  GUPS bundles the entire project during the export process, so the imported .zip file becomes the state's PUMA project. It's not the same as adding a shapefile for reference.

Proceed to the next sub-chapter for information on the final option for delineation, delineating PUMAs from a tabular equivalency file.

4.5 Delineate from a Tabular Equivalency File

This sub-chapter is written from the perspective of a SDC who has received delineation assistance from other interested data users and needs to import their work; however, other participants may use this option for PUMA delineation. One example of this situation may be a Council of Governments that is working with a major city to delineate PUMAs. The city may wish to provide an exported text file to the Council of Governments. The procedures described in the table below remain the same regardless of who is using the tool.

Participants that exported their delineation work from GUPS as a TEF using the Export Layer to Shapefile/TEF button or that prepared a comma-delimited spreadsheet/list of the 2020 census tracts with the PUMA codes and names may provide their text file to the SDC for consideration and inclusion in the state's PUMA project. SDCs use the Import Working File button from the PUMA toolbar to import the work from others into their PUMA project.

SDCs are encouraged to review the text files they receive of proposed PUMAs prior to importing them directly into their state's PUMA project. This will minimize import failures and prevent unnecessary edits or corrections to the PUMA project. A review can be conducted in Notepad, WordPad, or other spreadsheet software.

IMPORTANT: Participants that wish to use their own file of census tracts must ensure use of the 2020 census tract information, not census tracts from previous decades. The text file must be comma-delimited and must include fields for the two-digit state FIPS code, three -digit county FIPS code, six-digit 2020 census tract code (without decimal for suffix), five-digit PUMA code, and a PUMA name field (maximum of 85-characters). Except for the PUMA name field, all other fields must not omit leading or trailing zeros from their coding. Formatting the fields as "Text" maintains leading and trailing zeros that may appear in the data.

See **Figure 8** for an example of the TEF text file, exported from GUPS. In this figure, the Alabama state FIPS code is 01. Fayette County is 057. One of the census tracts assigned to PUMA 01400 is 020200. The POP20 field is not a requirement for importing, but is exported from GUPS when using the Export Layer to Shapefile/TEF button.

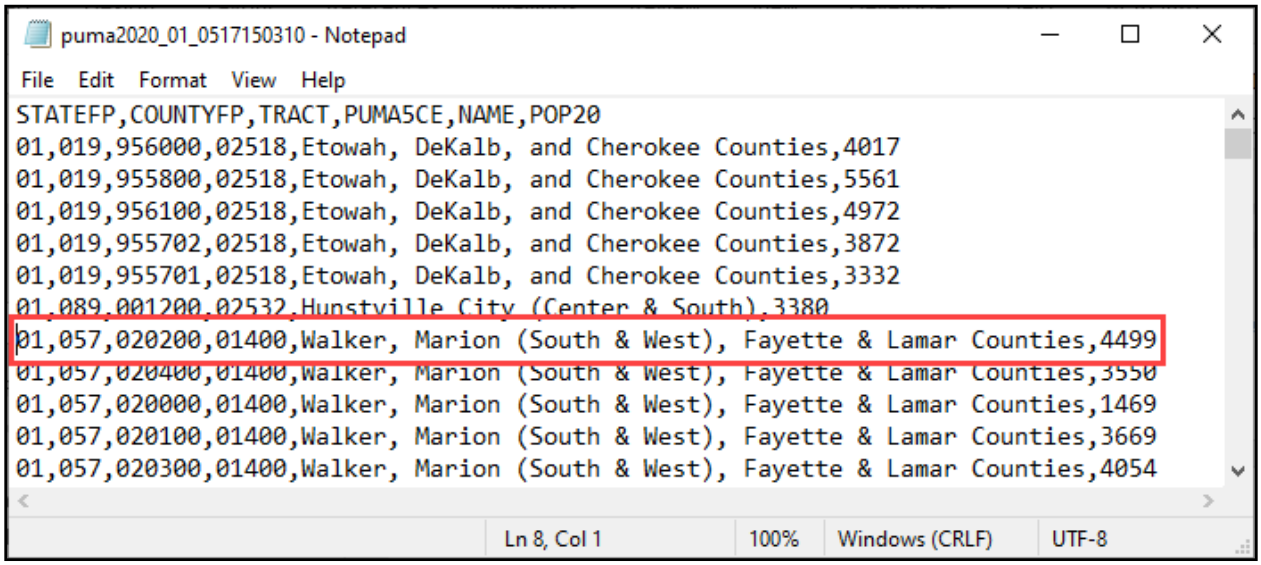
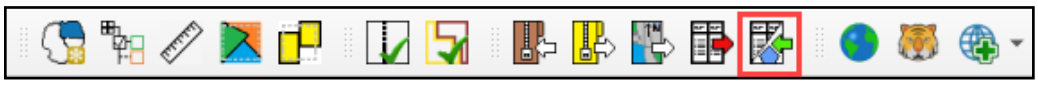
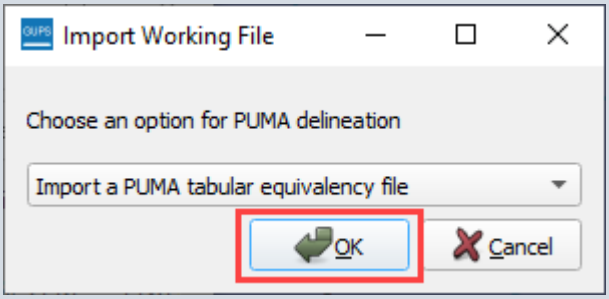
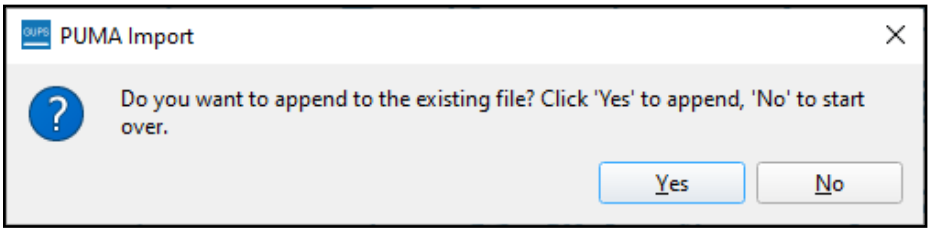


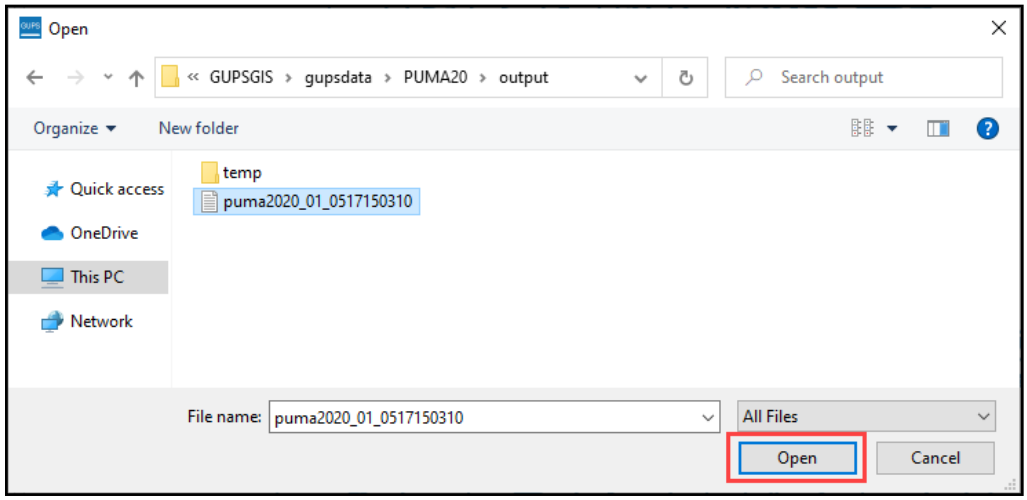
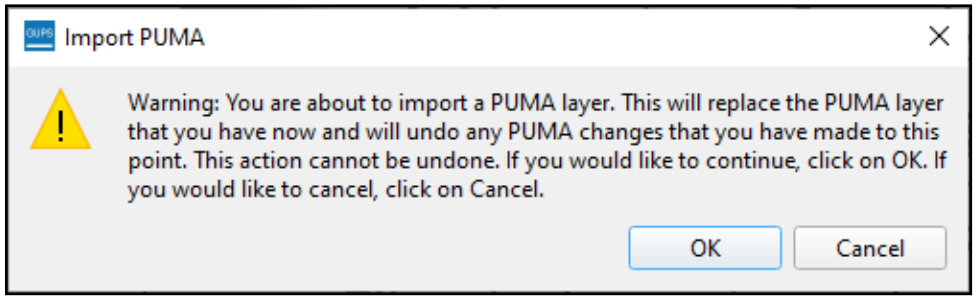
Figure 8: Example of a PUMA Tabular Equivalency File in Notepad

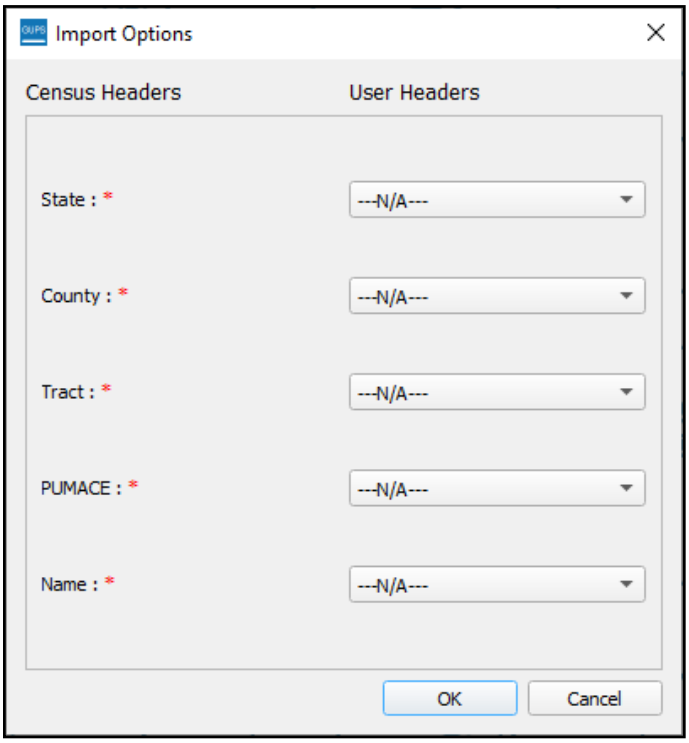
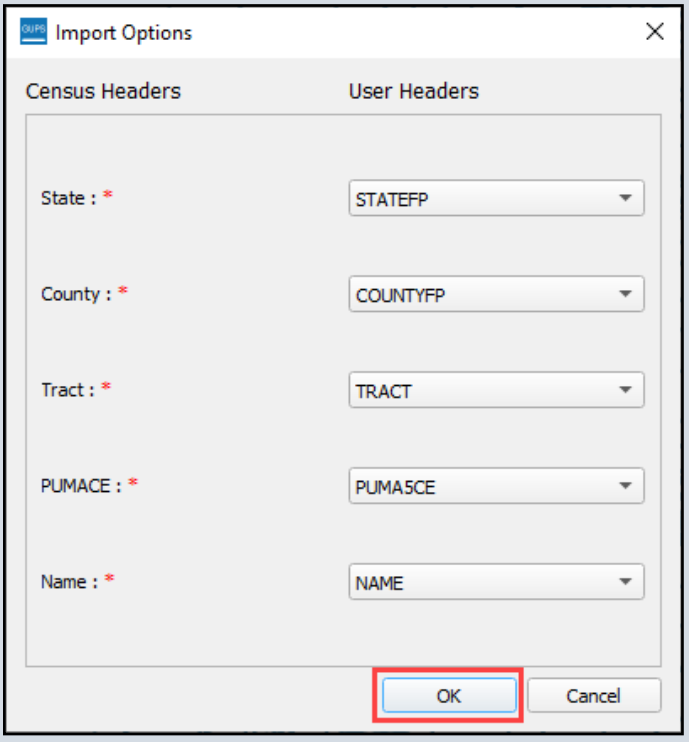
Follow the instructions in **Table 15** for steps to import this file into GUPS.

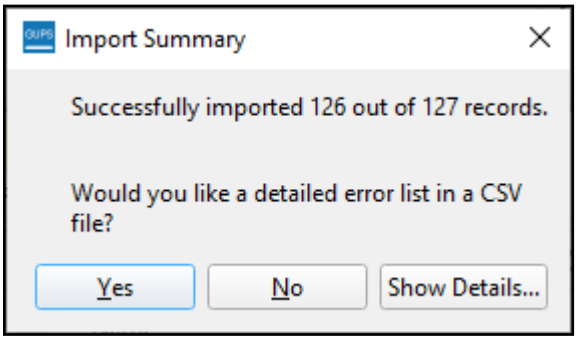
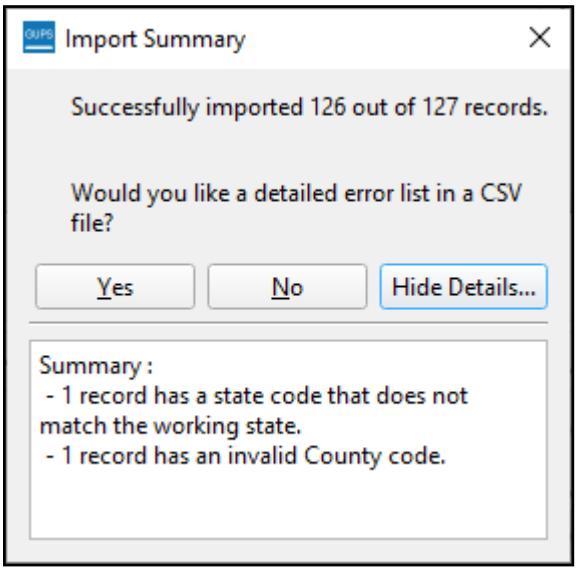
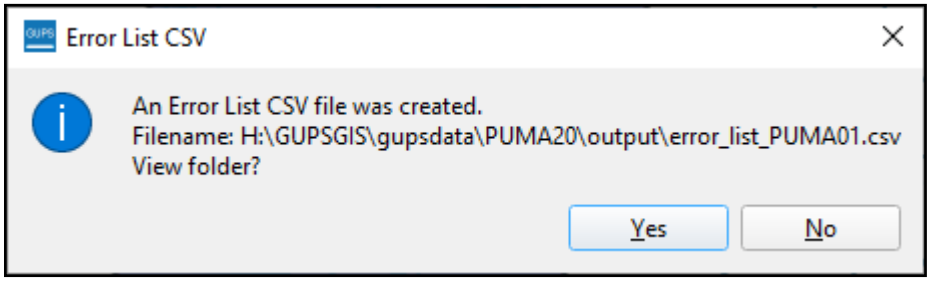
Table 15: Steps to Import a PUMA Tabular Equivalency File

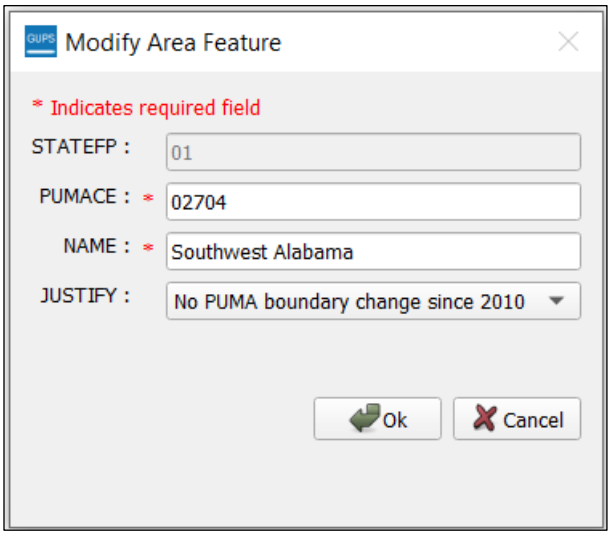
Step	Action and *Result(s)*
Step 1	With the state's PUMA project open in GUPS, select the **Import Working File** button from the **PUMA toolbar**. 

Step	Action and *Result(s)*
Step 2	*The **Import Working File** window opens*. Choose **Import a PUMA tabular equivalency file** from the drop-down menu of options.  Select **OK** to continue or **Cancel** to close the window.
Step 3	*The **PUMA Import** confirmation window appears*. Choose **Yes** to append the TEF to the existing PUMA project or **No** to replace the existing project with the contents of the TEF. 
	Choosing **No** will delete all previously saved delineation work in the existing project.

Step	Action and *Result(s)*
Step 4	*With the selection of **Yes**, a window opens for the selection of the TEF*. This example uses the TEF created in **Table 10**.  Depending how the TEF was created, the file can be in a variety of locally managed directories/folders. The **output** folder shown in this location is the default location for files exported from GUPS using the **Export Layer to Shapefile/TEF** button. *With the selection of **No**, a warning window appears seeking confirmation for the replacement of the existing delineations*. There is no restoration of any work in the project once **OK** is selected.  Select **OK** to continue and navigate to the file location as shown above or **Cancel** to return to the Map View.
	There is no restoration of any work in the existing PUMA project once **OK** is selected.

Step	Action and *Result(s)*
Step 5	*Once the file is chosen, an **Import Option** window appears.*  This window is used to select the fields in the file that correspond to the five required fields in the PUMA project to achieve a successful import.
Step 6	After the selection of the fields, choose the **OK** button to proceed or **Cancel** to close the window and begin again. 

Step	Action and *Result(s)*
	If an error(s) occurs with the import process, an **Import Summary** window appears with information about the problematic records.  To see more details about the error(s), select the **Show Details** button to expand the window.  To show less details, select the **Hide Details** button. Select the **Yes** button to generate a .csv file of the error(s) or select the **No** button to close the window without generating the file. This file is useful to discover more about the error(s) since they are not imported into the project.  If multiple errors occurred, a participant might wish to correct the TEF and reimport instead of making the corrections using GUPS.
Step 7	To correct the errors interactively in GUPS, to make changes to the correctly imported PUMAs, or to continue working on unassigned geographies select the **Modify Area Feature** button from the **PUMA toolbar** and follow the steps described in sub-chapter **4.2**.

Step	Action and *Result(s)*
	Changes that are made to the imported PUMAs launch the **Modify Area Feature** window to ensure the change is what the participant wants to make. 
Step 8	Save the project using the **Save Project** button on the **Standard toolbar** or the **Save** option beneath the **Project** tab on the **Menu bar**.

If the delineation work for the state is complete, proceed to **Chapter 5** for guidance on performing quality checks and criteria review. If delineation work remains, continue delineating interactively in GUPS by using the Modify Area Feature button, or by importing additional TEFs or shapefiles, as described in the previous sub-chapter.

CHAPTER 5 CONDUCT QUALITY CHECKS AND CRITERIA REVIEW

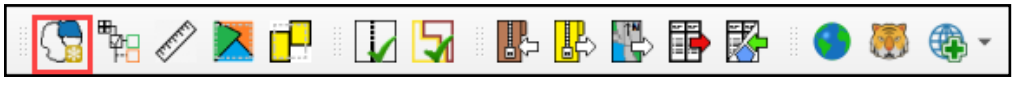
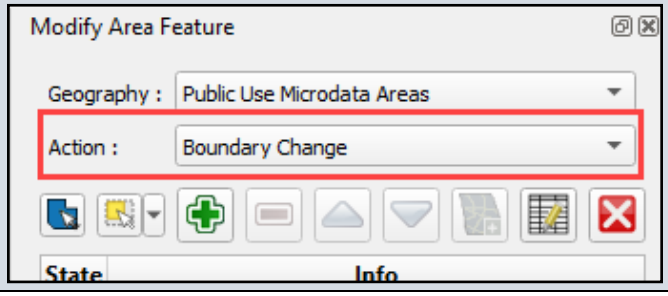
PUMAs must adhere to the finalized criteria and observe the established naming rules. GUPS is programmed to check for finalized criteria and guidelines to ensure the successful delineation of PUMAs. During delineation if a PUMA does not meet the established criteria, GUPS triggers warning messages. For some warnings, GUPS will prevent a participant from continuing, but for other, less critical warnings, participants can proceed, and the problematic PUMAs will reappear for resolution during criteria review, detailed in sub-chapter **5.1**.

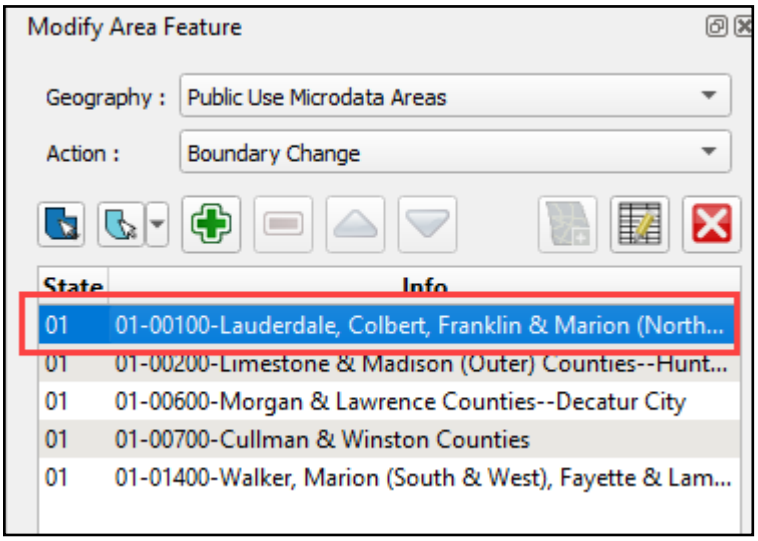
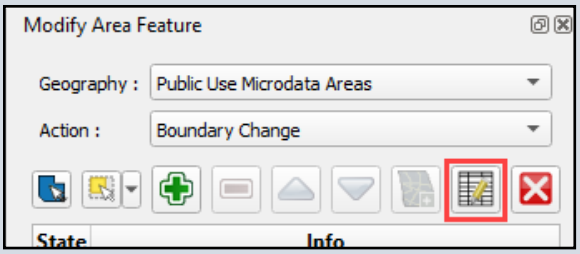
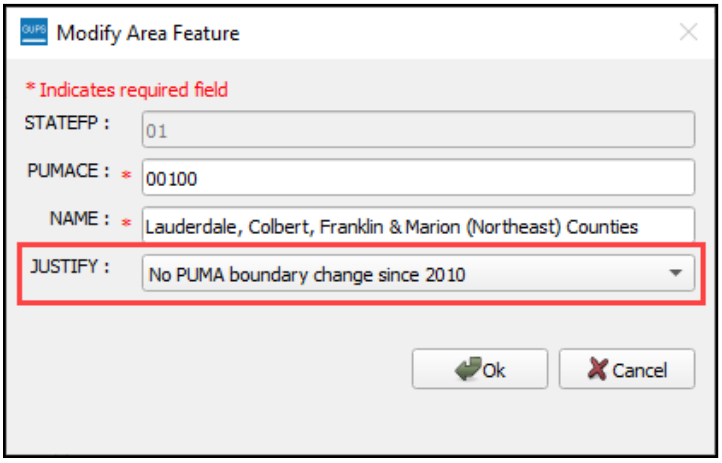
Though GUPS has an integrated criteria review, the Census Bureau recommends all participants conduct basic quality checks for issues that GUPS tools cannot identify. These checks are beneficial prior to executing the PUMA Criteria Review tool. Some basic quality checks include:

- Confirm the name accurately reflects the delineated area and follows the naming guidelines.
- Confirm the name is relative to the geography included within the PUMA.
- For PUMAs covering more than one county/city, confirm the order of name is correct.
- Confirm the name is spelled correctly.
- Confirm the code follows the coding guidelines.
  - Is the PUMA code maintained from previous vintage or new?
- Confirm the justifications provide adequate explanation for the requested exception.
  - PUMAs with justifications supplied during initial delineation will not appear as a criteria failure after executing the PUMA Criteria Review tool; therefore, it is very important to conduct a thorough quality check of each PUMA justification prior to export.

These quality checks are especially important if a participant is providing their suggested delineations to the SDC for inclusion in the state's PUMA project. The SDC may not be aware of coding and naming preferences of the participant that created the project. To review the codes, names, and justifications, follow the steps outlined in **Table 16**.

Table 16: Steps to Perform Quality Checks of Names, Codes, and Justifications

Step	Action and *Result(s)*
Step 1	Select the **Modify Area Feature** tool from the **PUMA toolbar**. 
Step 2	From the **Modify Area Feature** window, confirm the **Action** field is set to **Boundary Change**. 

Step	Action and *Result(s)*
Step 3	Select a PUMA from the list of PUMAs or in the Map View. 
Step 4	Select the **Change Attribute** button. 
Step 5	*A secondary **Modify Area Feature** window appears.*  Review content that appears in the **PUMACE**, **NAME** and **JUSTIFY** fields. Select **OK** to dismiss the window. The justification shown above is a participant entry, not a pre-selected option.
Step 6	Repeat steps 3-5 to review each PUMA in the **Modify Area Feature** window.

With the quality checks complete, review sub-chapter **5.1** for details on the PUMA Criteria Review tool. For interested data users that completed delineation for only part of a state, skip to sub-section **5.1.1** for instructions on using the tool on a partially completed state project.

5.1 PUMA Criteria Review Tool

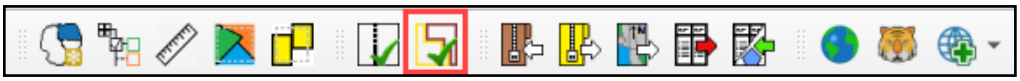
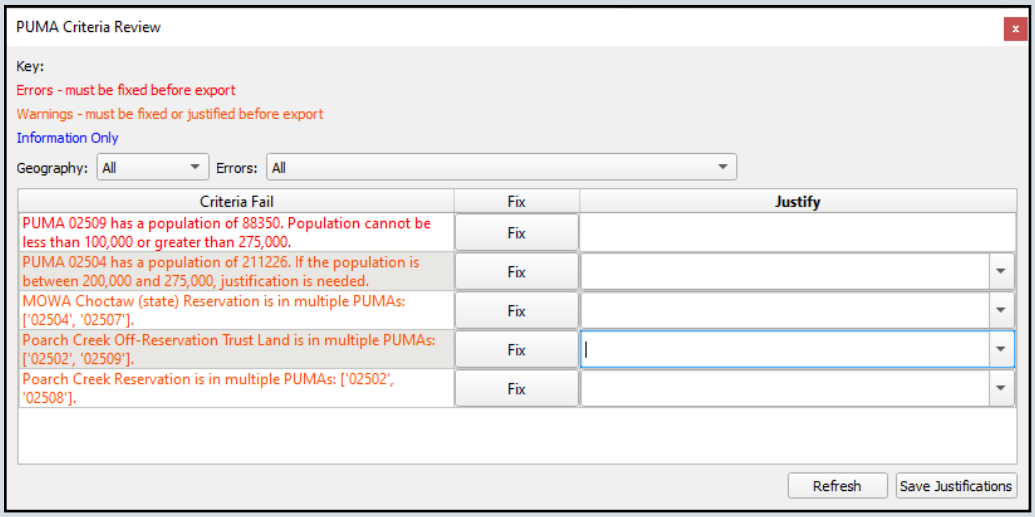
The PUMA Criteria Review tool reviews the PUMA project to confirm the finalized criteria are not violated. This tool will generate a list of failures for review. SDCs must execute the PUMA Criteria Review tool on their state's PUMA project prior to exporting for submission to the Census Bureau. Follow the steps in **Table 17** for details on executing the tool and the options for resolving the failures that appear for a completed PUMA project.

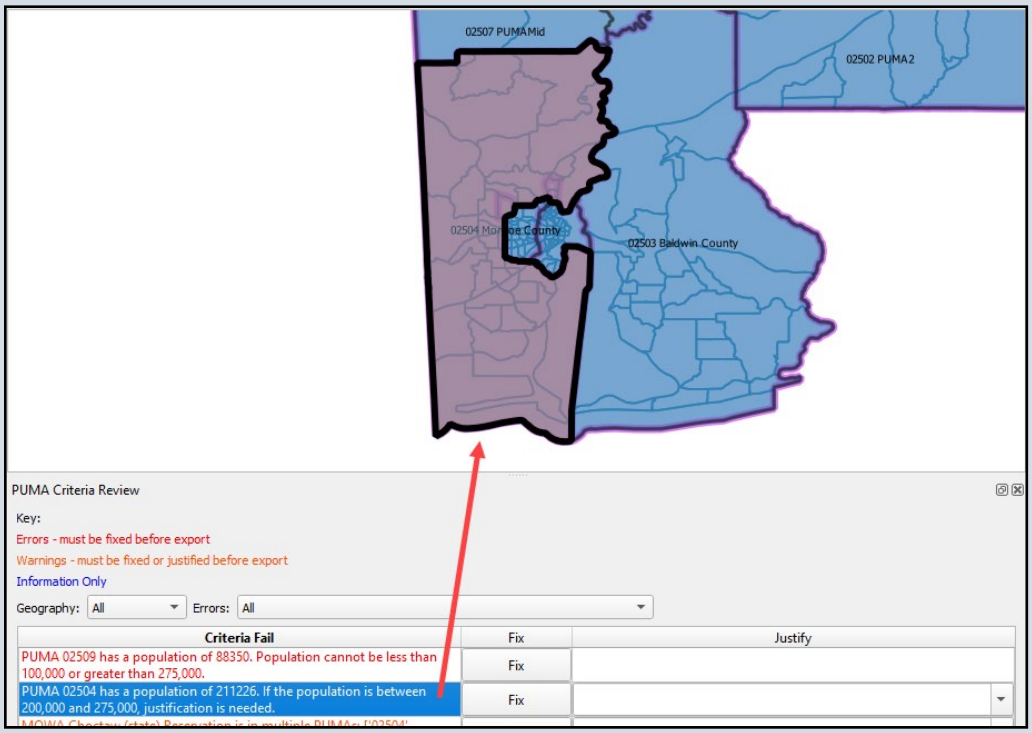
Criteria failures include, but are not limited to, the following:

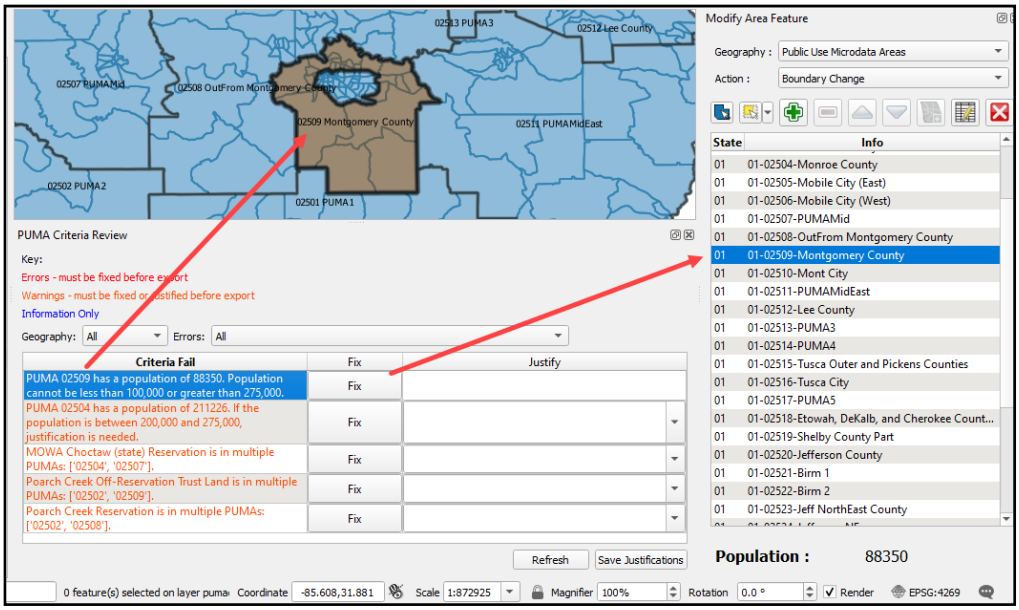
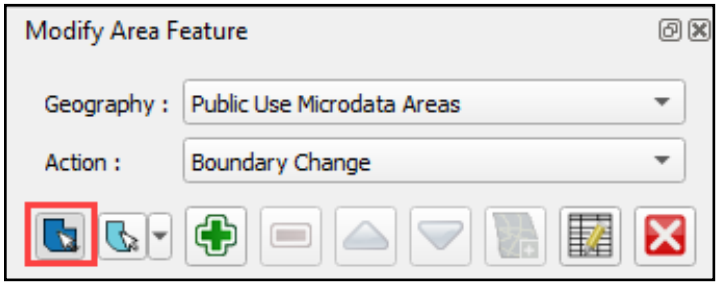
- Unassigned geographies (i.e., no PUMA assigned). These are labeled as "faces" in the review tool.
- PUMAs that fall above/below population threshold requirement.
- PUMAs with overlapping geographies (most common when importing files, not possible with interactive delineation).
- PUMAs with noncontiguous boundaries.
- PUMAs that cross county boundaries with the census tracts having population of less than 10,000.

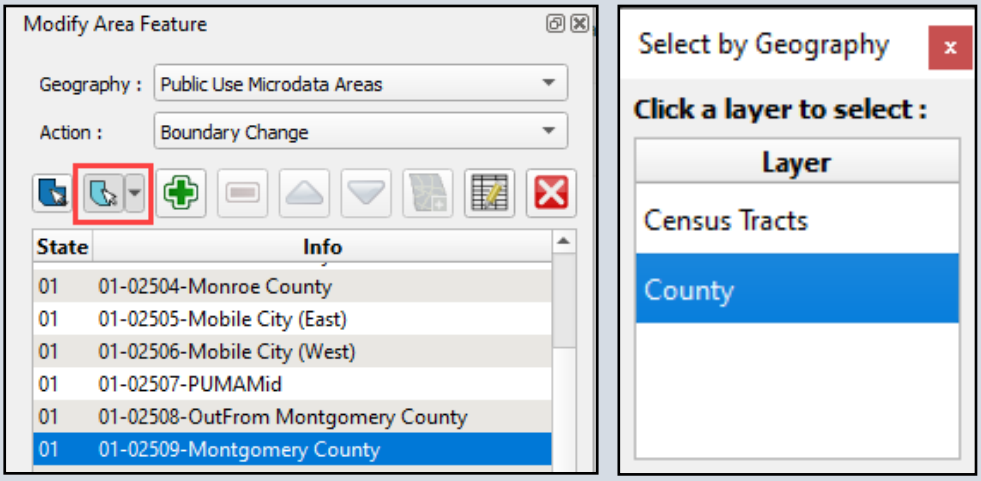
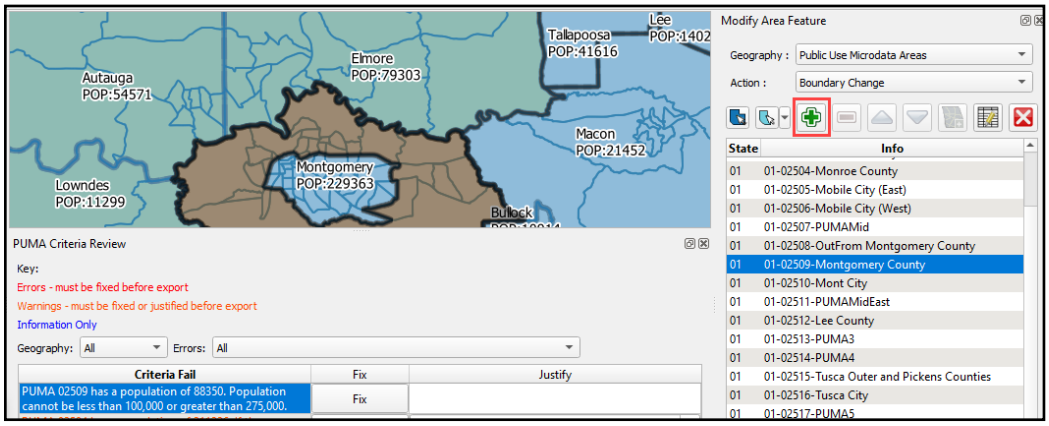
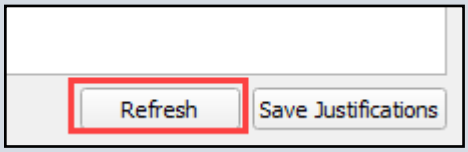
Note: Running the tool on a project that is incomplete will introduce criterial failures for each geography without an assigned PUMA; therefore, the steps in the table are written for a SDC with a completed PUMA project. Skip to sub-section **5.1.1** for instructions on using the tool on a partial state project.

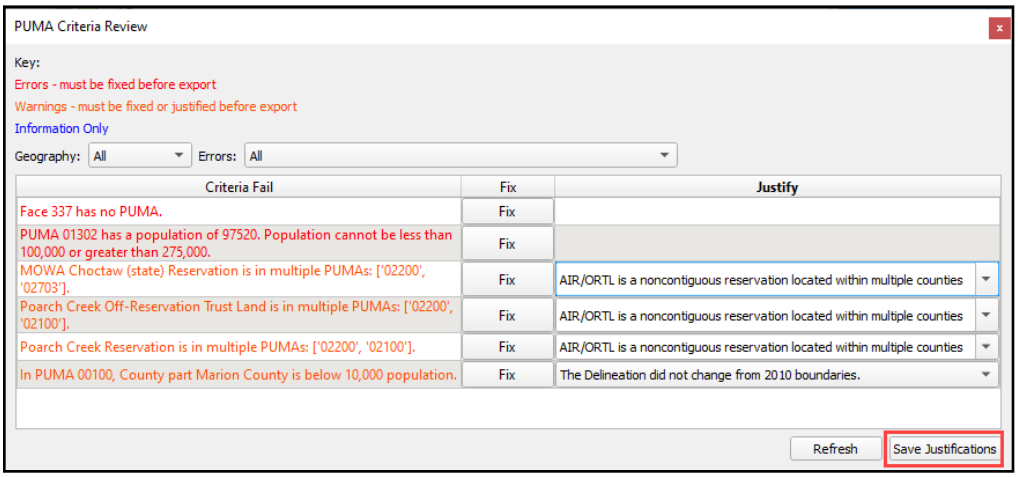
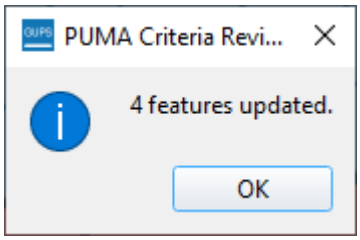
Table 17: Steps to Use the PUMA Criteria Review Tool and to Fix or Justify Failures

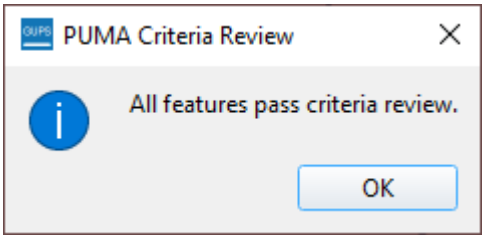
Step	Action and *Result(s)*
Step 1	With the state's PUMA project open in GUPS, select the **PUMA Criteria Review** button from the **PUMA toolbar**. 
Step 2	*The **PUMA Criteria Review** window appears with the criteria failures listed.* 

Step	Action and *Result(s)*
	The **PUMA Criteria Review** tool identifies three categories of criteria failures. **Errors** appear in red font in the PUMA Criteria Review window and must be fixed prior to exporting the project for submission. Participants cannot provide a justification for an error. **Warnings** appear in orange font and must be fixed or justified before exporting the project. **Information only** items appear in blue font and should be reviewed to confirm they are as expected. Please note that the colors in the Criteria Fail column do not correspond to the colors used for the "pumacurrent" layer in the Map View.
Step 3	To locate a PUMA with a criteria failure, select the PUMA in the **PUMA Criteria Review** window. *The Map View zooms to the selected PUMA*. Conduct a review of the delineation to determine whether to fix or justify the PUMA.  The Census Bureau recommends reviewing the **Errors** first, prior to tackling the **Warnings** and **Information Only** failures.

Step	Action and *Result(s)*
Step 4	To modify the delineation to resolve the Error or Warning, select the **Fix** button. *The **Modify Area Feature** window opens with the PUMA selected and the Map View zoomed to the PUMA.* 
	Though the problematic PUMA is selected, it may be necessary to select and modify a different PUMA to resolve the failure. For instance, if the problematic PUMA is too large, the participant needs to reassign county(s) or census tract(s) to a different PUMA. They would select an adjacent PUMA to modify, rather than the problematic PUMA and add counties or census tracts to the newly selected PUMA. Areas can only be added to PUMAs, not removed from PUMAs.
Step 5	As explained in sub-section **4.2.1**, use the **Select Target Area** button and choose the PUMA to modify in the **Map View** or from the list in the **Modify Area Feature** tool. This ensures the correct PUMA to modify is selected. 

Step	Action and *Result(s)*
Step 6	Activate the **Select Features by Geography** window to open the **Select by Geography** window and select either **Census Tracts** or **County**. 
Step 7	Use the mouse to select geography (census tract or county) assigned to another adjacent PUMA and then choose the **Add Area** button from the toolbar in the **Modify Area Feature** window to add the selected geography to the selected PUMA. 
	The PUMA will not disappear from the list of failures once it is corrected. Participants must save the project and choose the **Refresh** button at the bottom right of the **PUMA Criteria Review** window or re-run the **PUMA Criteria Review** tool. 

Step	Action and *Result(s)*
Step 8	To retain the delineation to resolve a Warning failure instead of fixing the PUMA, provide a justification in the **PUMA Criteria Review** window. First, review the delineation to determine if the PUMA is delineated as expected and confirm the warning is valid before keying or selecting a prefilled option from the **Justify** section of the **PUMA Criteria Review** window. The **Justify** field has a 150-character limit, so the field contains suitable space to provide a thorough justification. The **Criteria Fail** column provides the issue as well as the PUMAs involved. This information is helpful for researching a solution to the failures.  Select the **Save Justifications** button to save the work. *After the save completes, the PUMA Criteria Review window closes, and a confirmation window appears with the information about the records saved*. 
	In this example, the state includes an American Indian reservation. Participants must confirm that the counties and census tracts containing the reservation is assigned properly, taking into consideration noncontiguous pieces of reservation and/or off-reservation trust land that may prevent the AIR from being included in one PUMA. PUMAs that split reservations appear as Warnings for review in the PUMA Criteria Review tool.

Step	Action and *Result(s)*
Step 9	Save the project and re-run the **PUMA Criteria Review** tool to confirm all failures are resolved. *If the project is free from failures, a confirmation window appears*.  Dismiss the window by choosing **OK**.

For SDCs with a complete state project, proceed to **Part 3** for instructions to export and submit the state's PUMA project

5.1.1 Partial State Project and the PUMA Criteria Review Tool

Participants are not required to run the Criteria Review tool to export a PUMA project to share with another participant or to export a shapefile or a TEF of a partial state project. If executed prior to assigning PUMAs to the entire state, every unassigned census tract will be listed as a criteria failure. The tool sees each unassigned census tract (i.e., "face") as an error. For a partial delineation of PUMAs in the state, ignore these "Face x has no PUMA" failures. Participants may proceed with reviewing failures that appear for the delineated PUMAs to confirm their work is valid before providing the files to the SDC or another participant. See **Figure 9** for an example of how these errors appear in the PUMA Criteria Review window.

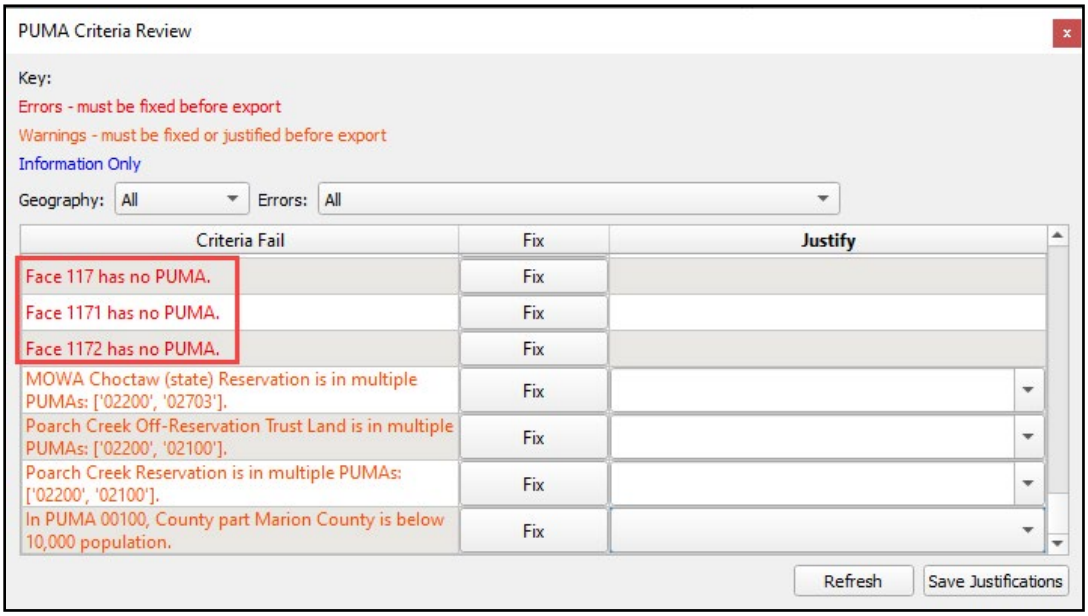


Figure 9: Example of the PUMA Criteria Review Tool with Errors for Unassigned Faces

PART 3 SUBMITTING A PUMA PROJECT

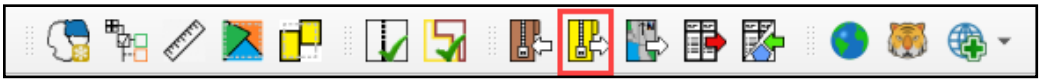
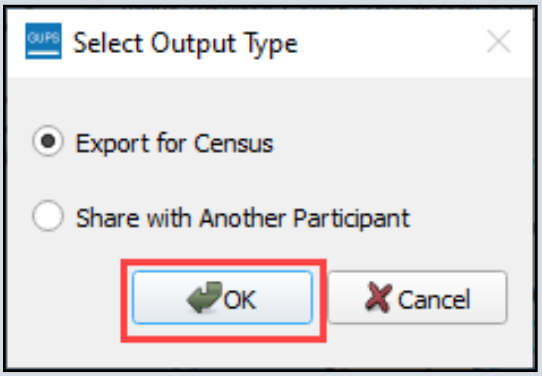
This part of the guide explains the steps to export a PUMA for submission to the Census Bureau as well as the steps for using the Secure Web Incoming Module (SWIM) to make the state's submission to the Census Bureau. The Census Bureau only accepts PUMA delineations from each state's respective SDC, so only SDCs need to review an apply the instructions within this part of the guide.

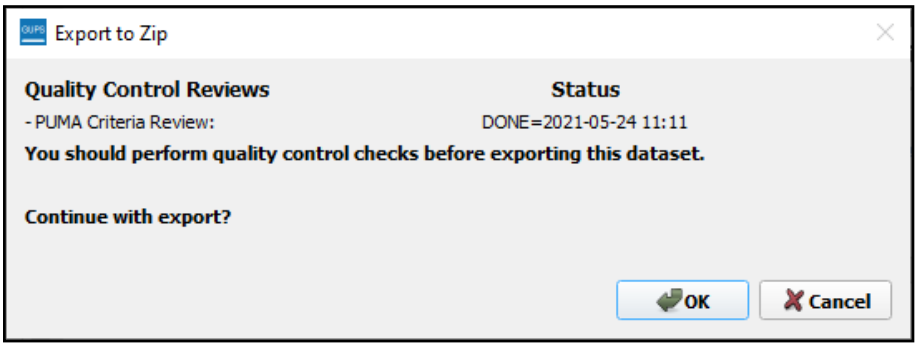
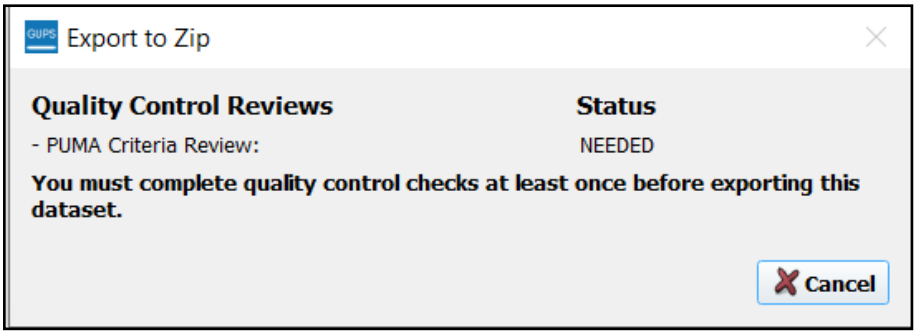
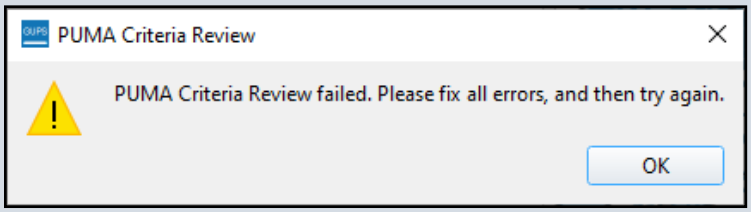
CHAPTER 6 EXPORT A PUMA PROJECT

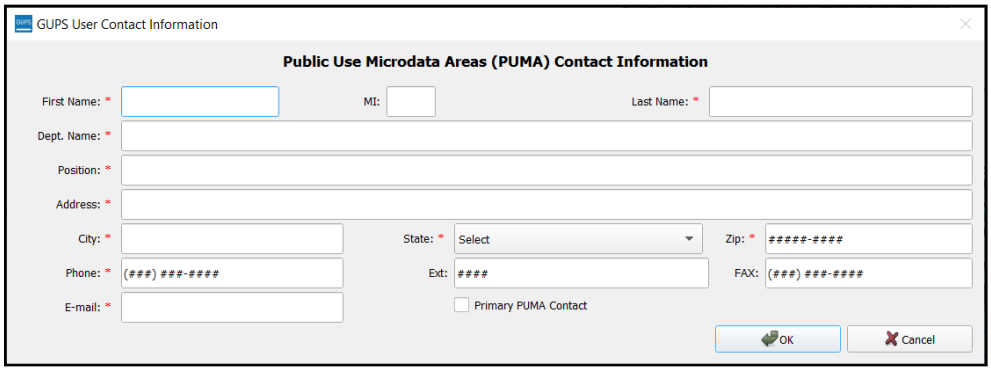
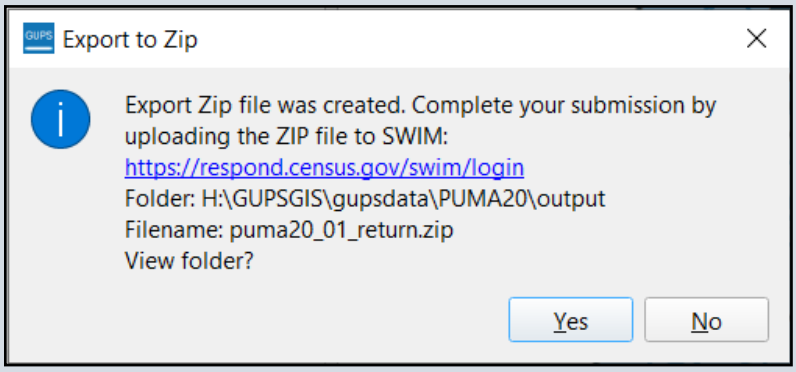
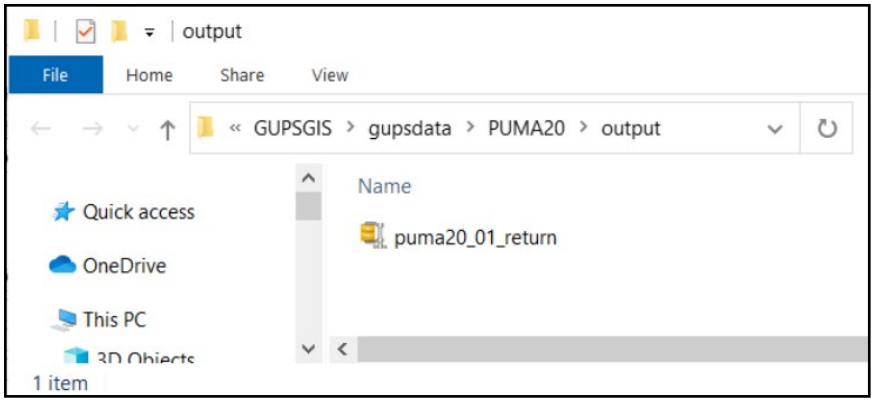
Once PUMA delineation and criteria review conclude, SDCs use the Export to Zip button from the PUMA toolbar to export their PUMA .zip file for submission to the Census Bureau. This chapter lists the steps to export the project.

The Export to Zip button on the PUMA toolbar reruns the PUMA Criteria Review tool quality checks prior to exporting the delineation work. To export the PUMAs, follow the steps in **Table 18**. GUPS packages all the files required by the Census Bureau into the zip file and saves it in the location created on the participant's computer during the GUPS installation process.

Table 18: Steps to Export the PUMAs for Submission

Step	Action and *Result(s)*
Step 1	Select the **Export to Zip** button from the **PUMA toolbar**. 
Step 2	The **Select Output Type** window opens with two options for export: **Export for Census** and **Share with Another Participant**.  Select **Export for Census** and **OK** to proceed with export or **Cancel** to return to the Map View.

Step	Action and *Result(s)*
	Before the tool proceeds, it reminds the participant to perform quality checks. If the PUMA Criteria Review has run, it provides the date and reminds that quality control checks should be performed prior to export.  If the PUMA Criteria Review has not run, it provides instruction to do so before exporting. The participant must cancel from this window and refer to sub-chapter **5.1** for instructions on executing the tool and fixing the errors. 
Step 3	The export process checks the validity of the PUMAs as it prepares the .zip file. If the project contains criteria failures, a warning message appears with instructions to fix all errors and try the export process again.  Return to sub-chapter **5.1** for instructions on executing the tool and fixing the errors.

Step	Action and *Result(s)*
Step 4	If the export was successful, *the **PUMA Contact Information** window appears for the participant to complete*. Complete the form and select **OK**. 
Step 5	Once the export completes, *the **Export to Zip** window appears confirming a successful export and providing the location of the exported .zip file*. 
Step 6	Selecting **Yes**, opens a window that shows the location (path) of the exported file. 

With the export process complete, proceed to the next chapter for instructions on submitting the file using the Secure Web Incoming Module (SWIM).

CHAPTER 7 SECURE WEB INCOMING MODULE (SWIM)

All submissions for the 2020 PUMA must be sent to the Census Bureau using the SWIM. SDCs use the instructions in this chapter to establish or access a SWIM account and submit their state's PUMA project.

Some SDCs may have staff with established SWIM accounts from other Census geography programs. If so, that person may submit the state's PUMA submission using their existing account. For SDCs without staff with an established account, contact the Census Bureau by email at <geo.puma@census.gov> to request a registration token.

To check for the existence of a SWIM account or to reset a password on an established account, choose "Forgot your password?" on the main SWIM page and enter the email address in question to check for the existence of an account. If SWIM locates an account, it asks the established security question for the account, for which the answer is not case-sensitive, and sends an email to reset the forgotten password. If SWIM does not locate an account associated with the email address, it returns the following message, "*No account registered for this email address. The email address associated with the account is case sensitive. Try again with the proper case or go to* Account Registration *to register for a SWIM account*." Choosing the Account Registration link opens another window to establish a SWIM account; however, the SDC staff person must have a registration token to proceed.

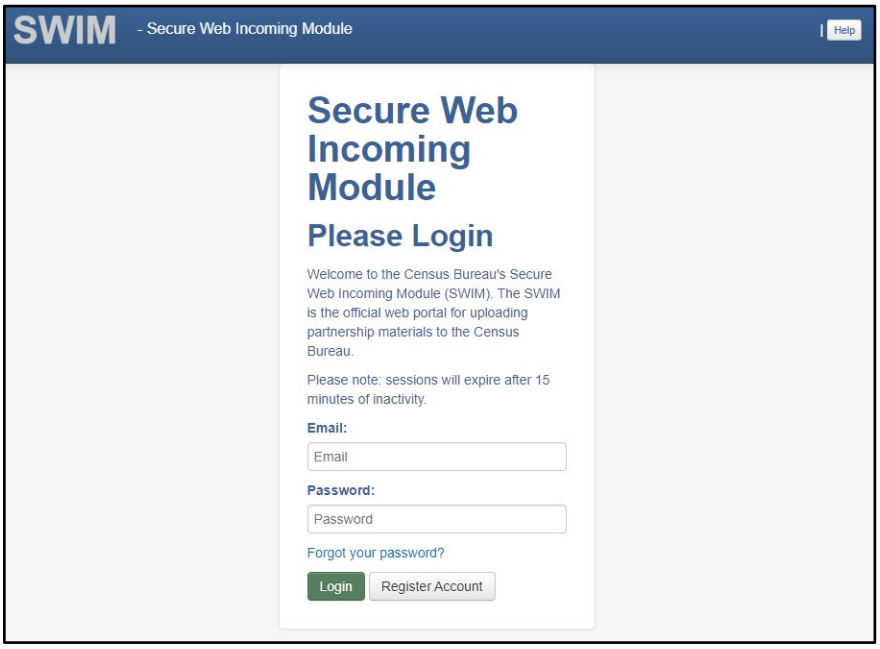
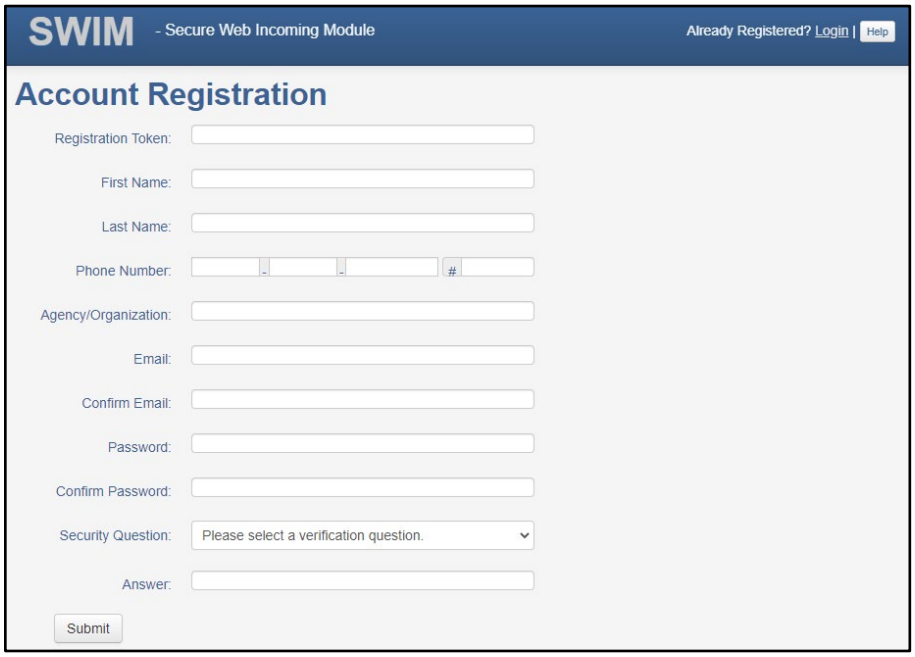
Note: The components of both the email address and the password of SWIM accounts are case-sensitive. Make note of the format used when establishing the SWIM account (e.g., jane@anytown.org or Jane@anytown.org or JANE@ANYTOWN.ORG). The Census Bureau recommends use of lowercase letters and safe retention of this information for future reference.

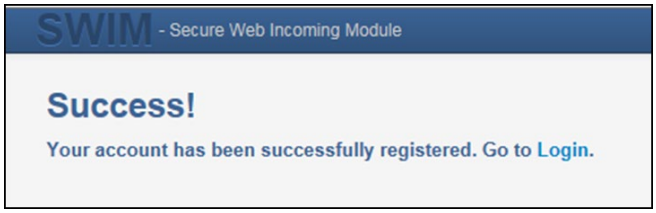
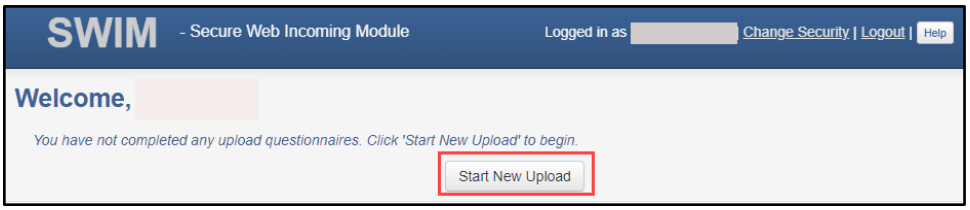
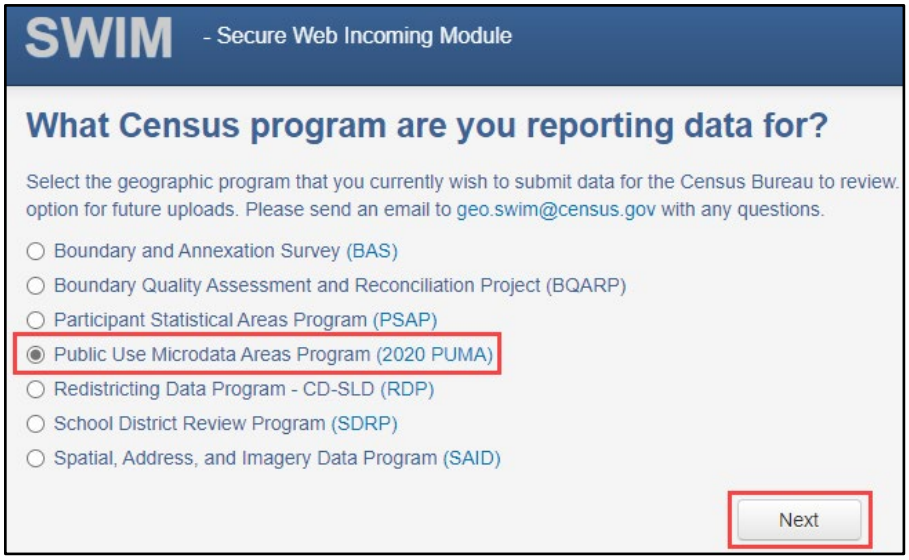
SWIM allows four attempts to login before it temporarily locks the account for 15 minutes. After the lock expires, try to login again or reset the password using the aforementioned "Forgot your password?" link on the login page. Once reset and logged into SWIM, account holders may modify their password and security answer by selecting "Change Security" link along the top, right side of the window.

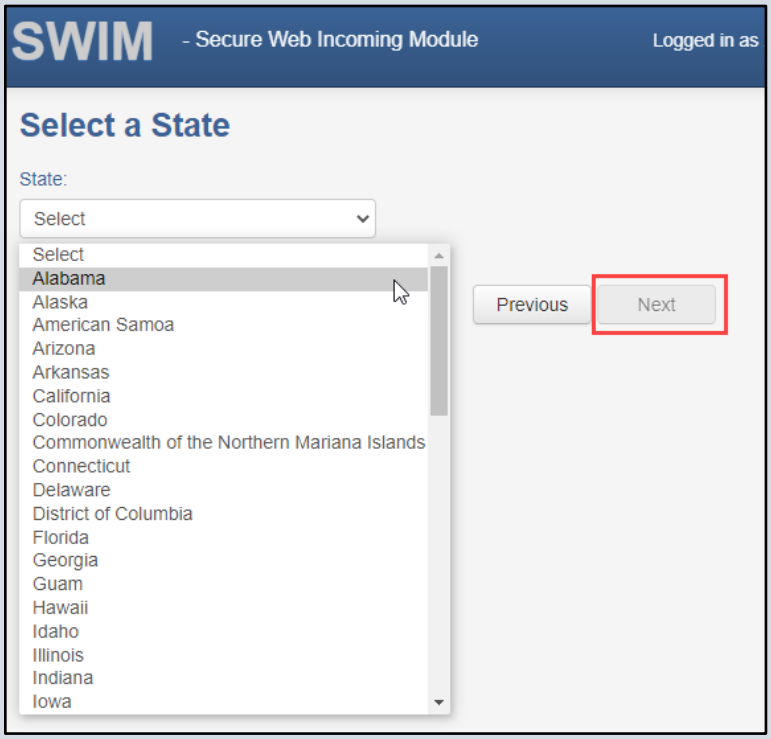
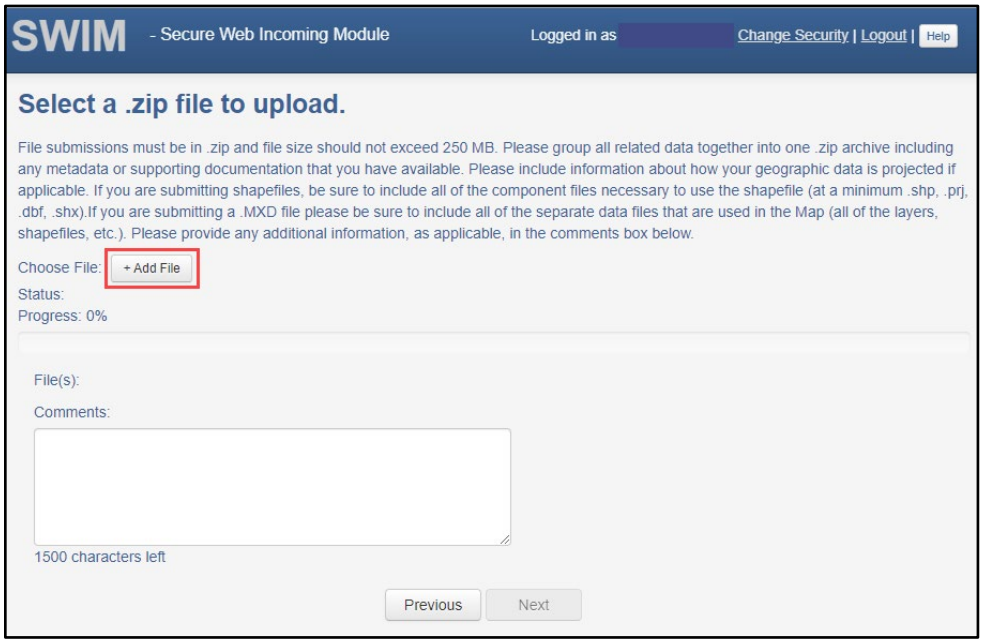
If login issues persist, confirm the vintage of internet browser version. SWIM runs on the two most recent versions of each of the major internet browsers, Microsoft Internet Explorer®, Microsoft Edge®, Google Chrome®, Mozilla Firefox®, and Apple Safari®. If the browser version is older, upgrade the version. If problems still occur with SWIM, contact the Census Bureau because it may be necessary to create a new SWIM account.

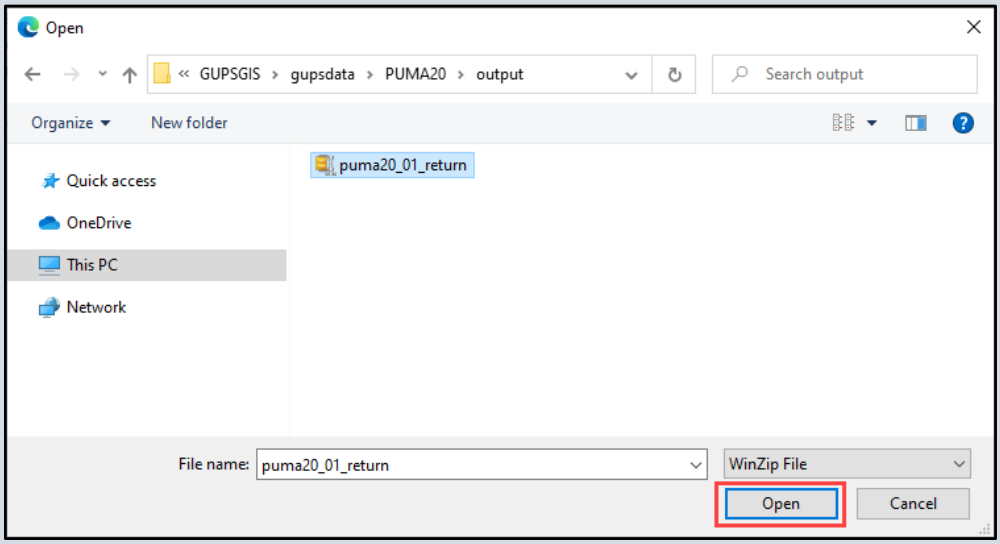
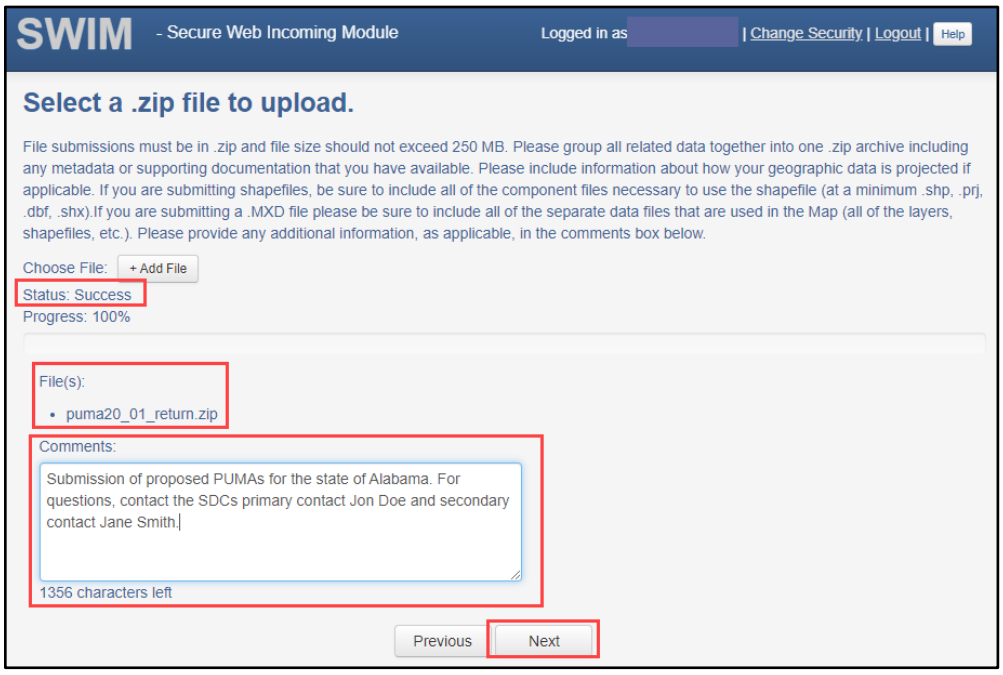
SWIM file requirements include submission of .zip file format. The .zip file may not include another .zip file as a component and it must not be larger than 250 megabytes. Do not create separate zip files for supporting documentation, the shapefile suite of files, or any other relevant case information. Include all those materials in one .zip file. Follow the steps below for instructions on using SWIM to submit the PUMA .zip file.

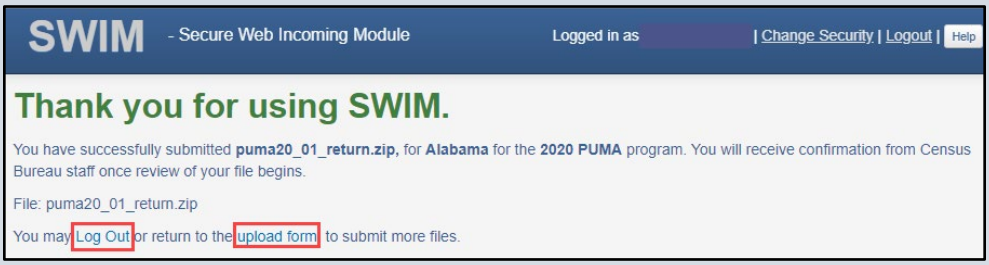
Table 19: Steps to Use SWIM

Step	Action and *Result(s)*
Step 1	Open a new browser window and enter the SWIM URL <respond.census.gov/swim> to open the SWIM Login screen. 
Step 2	For persons with an existing SWIM account, enter the email address and password associated with the account and choose the Login button. Skip to **Step 6**.
Step 3	For persons without an existing SWIM account, have the 12-digit registration token provided by the Census Bureau ready for account registration. Select the **Register Account** button to open the "Account Registration" screen. All fields within this screen are required. Select the **Submit** button to continue. 

Step	Action and *Result(s)*
	The password must be at least 8-characters in length and have at least one uppercase character, one lowercase character, one number, and one special character. Valid special characters are limited to the #, !, $, *, &, ?, and ~. The comma is not a valid special character for use in the password. The commas shown in the list of valid special characters are for spacing purposes only.
Step 4	*A **Success!** pop-up window appears confirming successful account registration*. 
Step 5	Choose **Login** to return to the SWIM Login screen to enter the newly established account login and password information.
Step 6	With a valid login and password, *the **Welcome** screen opens*. To submit the SDC's PUMA submission .zip file, choose the **Start New Upload** button. 
	If the account has uploaded other files for different geography programs administered by the Census Bureau, a list of files previously uploaded by the SWIM user displays on the page.
Step 7	*The **What Census program are you reporting data for?** screen opens*. Choose the **Public Use Microdata Areas Program (2020 PUMA)** radio button and then the **Next** button. 

Step	Action and *Result(s)*
Step 8	*The **Select a State** screen opens*. Choose your state from the drop-down menu and then the **Next** button. 
Step 9	*The **Select a .zip file to upload** screen opens*. Disregard the language regarding grouping all related data into one .zip file. The PUMA GUPS handles this grouping of files/data. Choose the **+Add File** button. 

Step	Action and *Result(s)*
Step 10	*The **Open** screen appears*. Navigate to the directory location of the exported PUMA .zip file (e.g., /GUPSGIS/gupsdata/PUMA20/output) and select the file and then the **Open** button. 
Step 11	Upon completion, the **Status** field shows **Success**, and the name of the .zip file appears in the **File(s)** field. Add additional, pertinent information to the **Comments** section if applicable. Choose the **Next** button to proceed with the upload. 

Step	Action and *Result(s)*
Step 12	*The **Thank You** screen appears and indicates a successful transfer of the file.* GUs can expect to receive an email once processing of the file begins and throughout the process as questions arise. Choose either **Upload Form** or **Log Out** option from the Thank You screen message. 

Congratulations on the completion of PUMA delineation using GUPS and the submission of those delineations using SWIM. The Census Bureau will review all submissions to ensure they meet the established criteria and will contact SDCs if there are questions. Other than this communication, there are no plans for formal feedback. Finalized PUMAs and their associated PUMS data will be available online for use beginning the summer of 2022.

APPENDICES

APPENDIX A SUMMARY OF ADDITIONAL PROGRAM DOCUMENTS

This appendix summarizes the final criteria, the naming guidelines, and coding guidelines.

Note: A summary guide and FAQs document are also available on the 2020 PUMA website. The Census Bureau encourages participants review those materials for high-level summarization of the program and specific answers to questions that may arise.

A1 Final Criteria

Below is a summarization of the final criteria and guidelines for 2020 PUMA. Refer to the *2020 PUMA Final Criteria* document on the 2020 PUMA website for more details.

- Minimum Required Population and Maximum Suggested Population
  - Require minimum population threshold of 100,000 persons with the ability to maintain this population throughout the decade.
  - Should not contain more than 200,000 persons, unless defining the PUMA for an area where significant population decline is anticipated.
- Relationships with Other Geographic Areas
  - Must not cross state boundaries.
  - Should comprise an area that is either entirely inside or entirely outside a core based statistical area (CBSA) where possible.
  - Should use 2020 place definitions, 2010 urban/rural definitions, and local knowledge to inform 2020 PUMA delineations.
  - Should avoid splitting Census Bureau urban areas.
  - Should avoid splitting governmental minor civil divisions (MCDs).
  - Avoid splitting American Indian reservations and/or off-reservation trust lands (AIRs/ORTLs), particularly if the population is included within all parts of the split AIR/ORTL. Since AIRs/ORTLs may cross state boundaries, this guideline applies only to the portion of an AIR/ORTL within a state. In all such instances, consider the total population and makeup of the affected areas in any decisions regarding the adjustment of PUMAs for AIRs/ORTLs.
    - If the AIR/ORTL has a population of <100,000, it should be contained within one PUMA.
    - If the AIR/ORTL has a population of <200,000, it should be contained within no more than two PUMAs.
- Geographic Entities Used to Define
  - Must use counties (and equivalent entities), and/or census tracts to construct.
  - A single county may be a PUMA if it meets the 100,000 minimum population threshold.
  - Two or more contiguous counties may be combined to form a PUMA that meets the 100,000 minimum population threshold.
  - Divide counties with more than 200,000 population using census tracts. Consider aggregation of census tracts that approximate the extent of other geographic entities (e.g., MCDs, incorporated places, census designated places, and/or urban areas).

    - Census tract-based PUMAs may cross county boundaries provided each PUMA-county part meets a minimum population threshold of 10,000. This is an increase from the 2,400-minimum requirement from 2010. This change is intended to further ensure the confidentiality of data in a PUMA-county part, align with the 2020 Census urban area plans, and eliminate unique geographic areas with low population.
- Contiguity and Noncontiguity Guidelines
    - To the greatest extent possible, each PUMA should encompass a single, geographically contiguous area.
    - May be noncontiguous if the county, counties, or census tracts used to form the PUMA are noncontiguous.
    - Use of noncontiguous building blocks is acceptable where it facilitates more demographically homogenous areas; however, this is not intended to create highly fragmented PUMAs.
    - All noncontiguous PUMAs are subject to Census Bureau final review and approval.
- Place of work (POW) and Migration (MIG) PUMAs
    - Delineated by statisticians, not as part of the 2020 PUMA, using Place of work data and in/out migration data after the 2020 PUMA concludes.
    - Standard PUMAs used to create POWPUMAs and MIGPUMAs; therefore, carefully consider standard PUMA relationships with other geographic areas when forming the standard PUMAs.
    - Can consist of a single PUMA or combination of PUMAs (county-based or census tract-based), but must aggregate to whole counties. Carefully consider how this will affect the eventual aggregation of PUMAs that are not delineated using whole counties.

A2 Coding Guidelines

Below is a summarization of the coding guidelines. Refer to the *2020 PUMA Coding Guidelines* document on the 2020 PUMA website for more details.

- Must be a unique, five-digit numeric code that ranges from 00100 to 99995.
- Preserve the 2010 PUMA code for 2020 if the geographic extent of the proposed PUMA remains unchanged from 2010, except when it is necessary to establish an orderly, logical coding scheme within the state, as described in the next guideline.
- Should be assigned sequentially within a state, beginning with 00100, 00200, 00300, and so forth in an orderly, logical manner. They should not be randomly assigned.
    - To establish this orderly, logical manner, assign codes using a geographic sequence that begins in the northwest corner of the state. Proceed with coding from west to east, then east to west in a serpentine fashion until each PUMA is coded. This sequence of coding promotes easy identification by visual inspection and review since codes that are close in numeric sequence should be close geographically.
- Assign “00” as the fourth and fifth digits of the PUMA code for each PUMA that consists of either an entire county or group of whole counties.
- Assign the same first three digits of the PUMA code and increment up from “01” for the fourth and fifth digits, for each PUMA that splits a county or group of counties. PUMAs that are delineated using census tracts instead of whole counties, should be coded in this manner.

A3 Naming Guidelines

Below is a summarization of the naming convention rules and guidelines presented in the *2020 PUMA Naming Guidelines* located on the 2020 PUMA website. Refer to that document for additional information on the structural components of a PUMA name and for details on the toponymy of PUMA names and particular associations to the communities and feature that the name represents.

- Must not exceed 85 characters.
- Must be unique within the state.
- Must not include the state name or abbreviation, except where there is no clear cultural focus or topographic name that can be applied to the PUMA.
- May include hyphens to connect the names of multiple geographic areas.
- Must use the Roman alphabet as normally used for writing the English language.
- Use hyphens to join names for PUMAs with multiple geographies areas and list them in the order of population size or regional importance, listing the most populous or most important first.
- May use diacritical marks (i.e., accents, rings, tildes, and umlauts).
- May include a limited number of abbreviations. Use of all other abbreviations are discouraged and must be approved by the Census Bureau.
- Deference given to names submitted by SDCs; however, the Census Bureau may edit the proposed names to adhere to programmatic and technical needs.

APPENDIX B TROUBLESHOOTING GUPS INSTALLATION

If the default Map Management window, as shown in **Figure 10**, does not display after opening QGIS (**Figure 11**), then this indicates a GUPS installation issue.

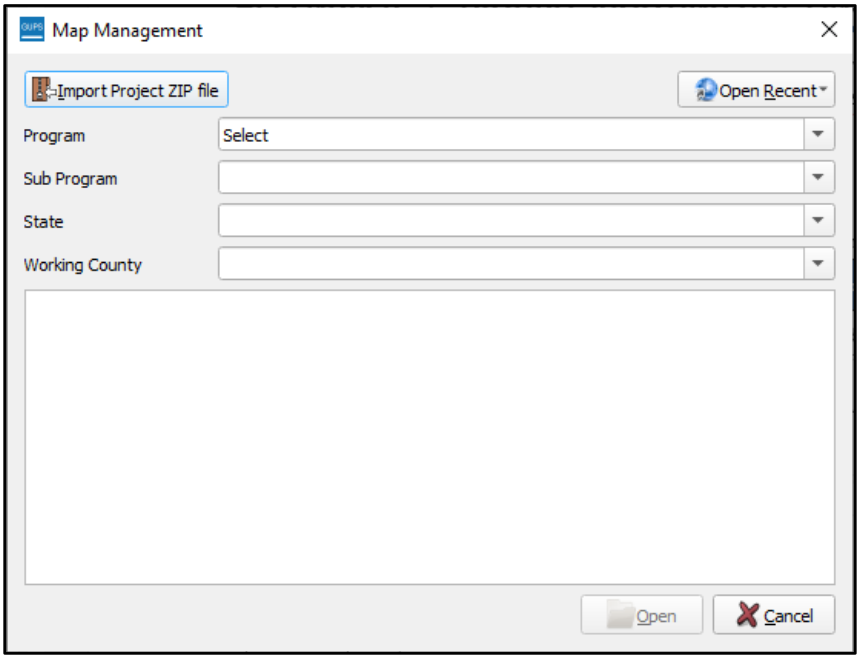


Figure 10: Default Map Management Window

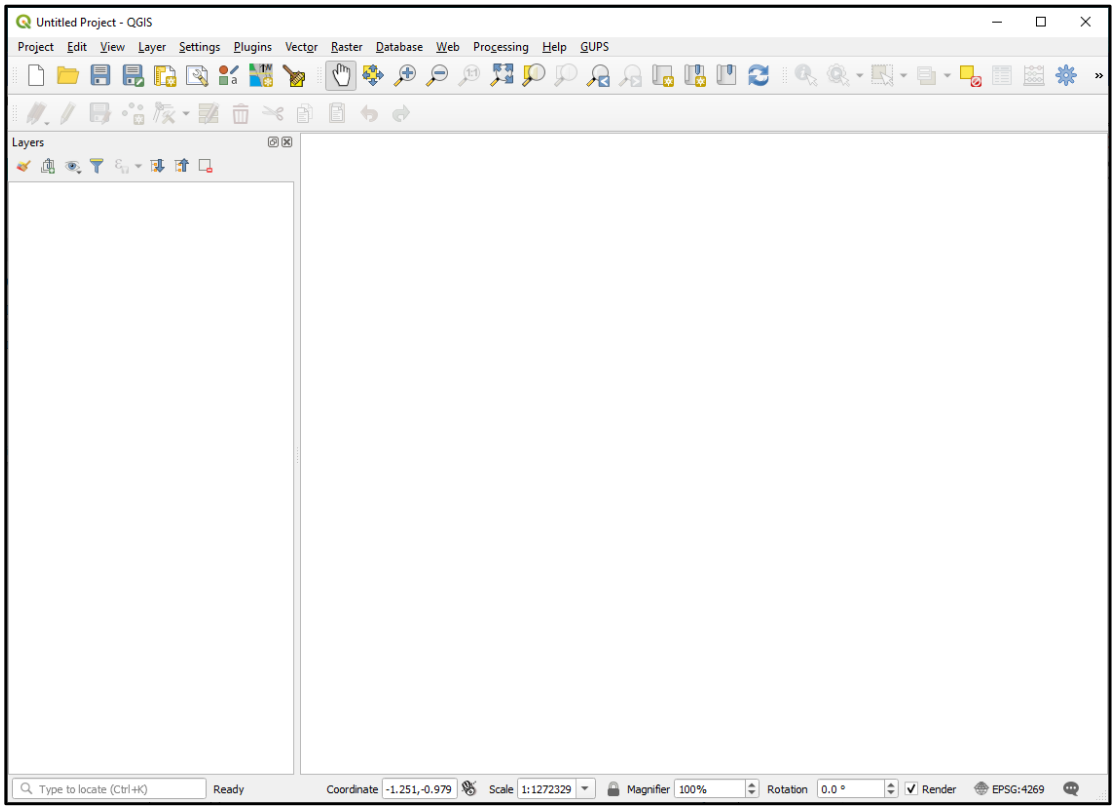
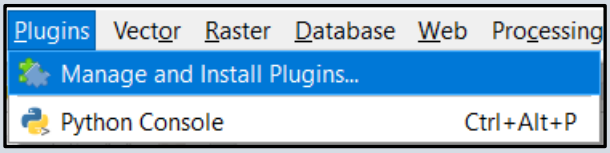
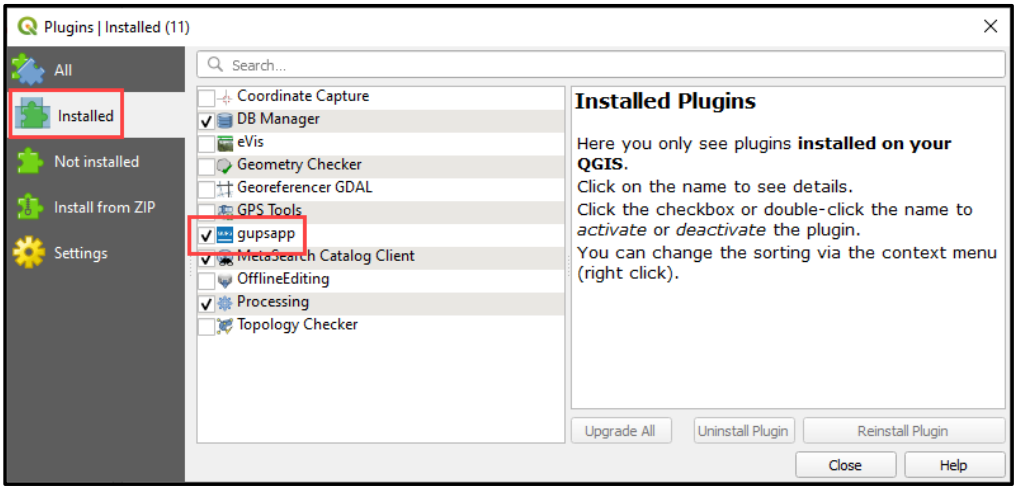
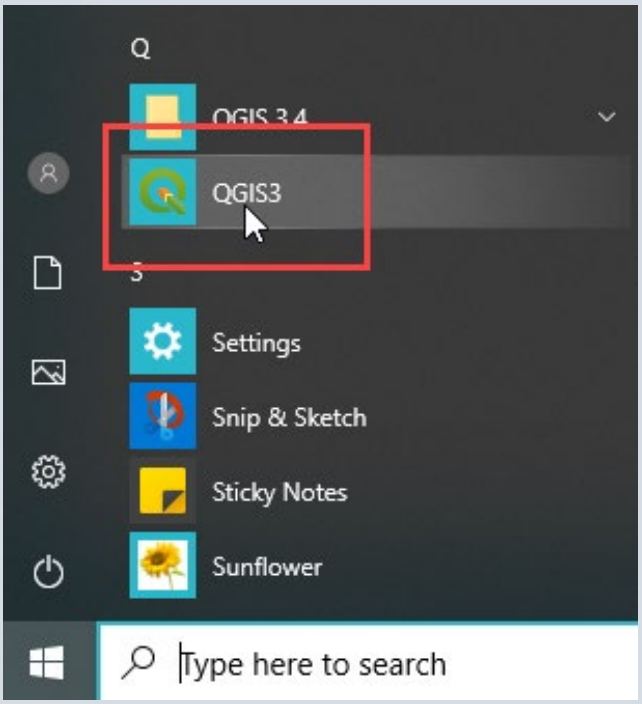


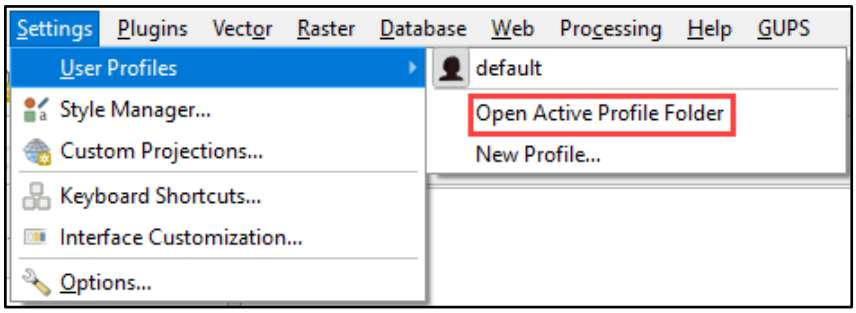
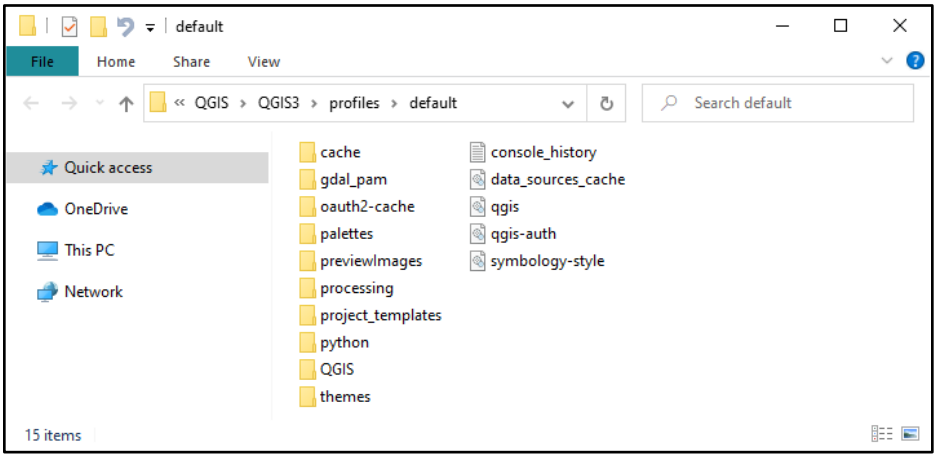
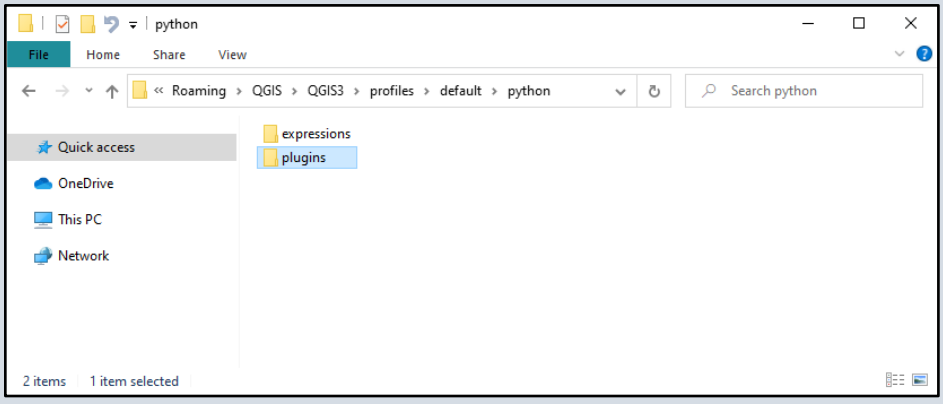
Figure 11: QGIS without a Map Management Window

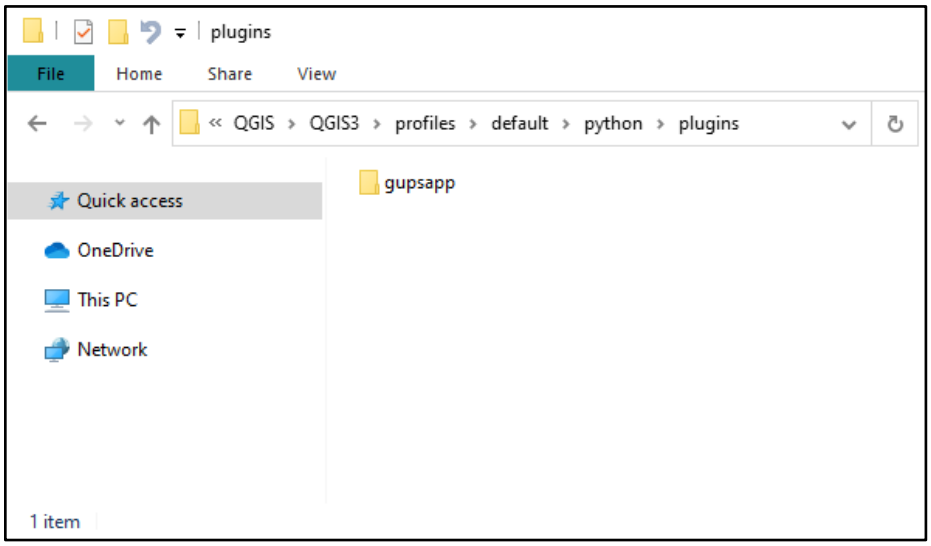
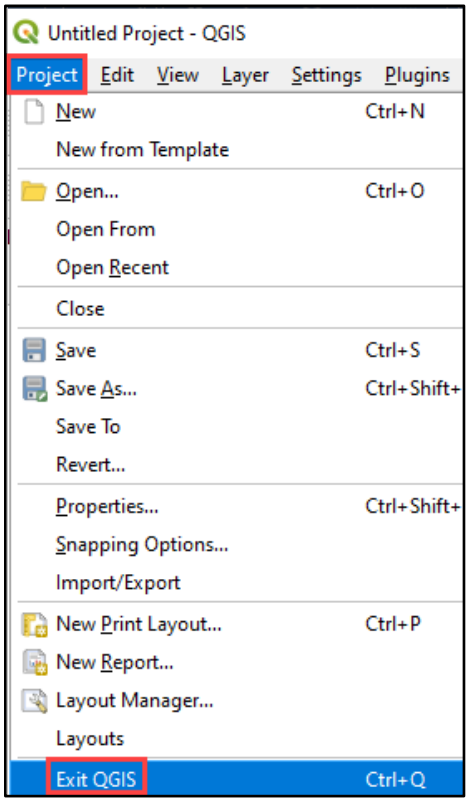
Follow the instructions below in **Table 20** to correct the installation issue(s). If problems persist after applying the instructions in the table below, contact the Census Bureau by email at <geo.puma@census.gov> for assistance.

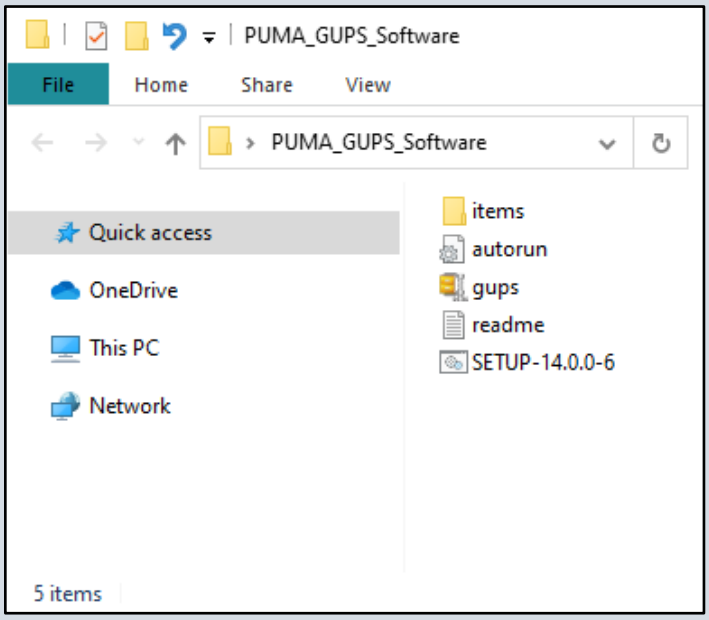
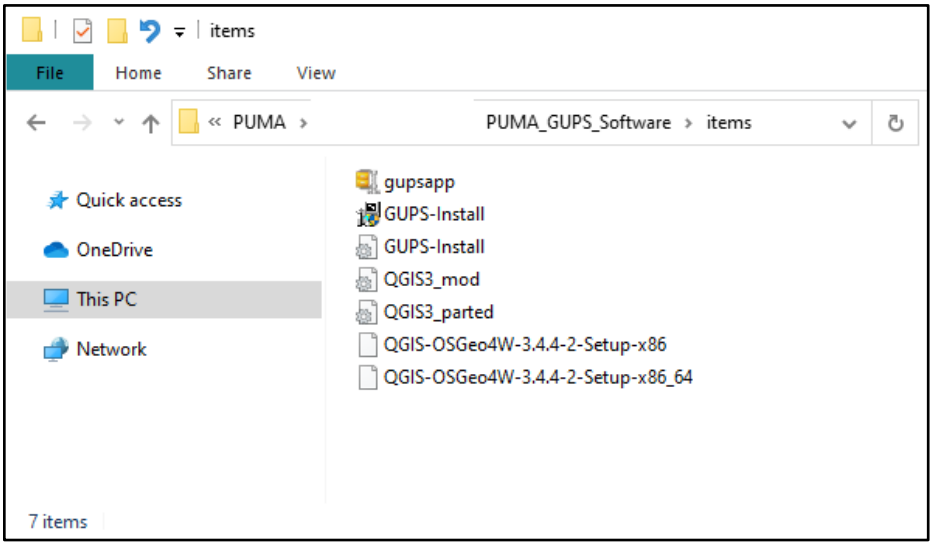
Table 20: Steps to Troubleshoot GUPS Installation

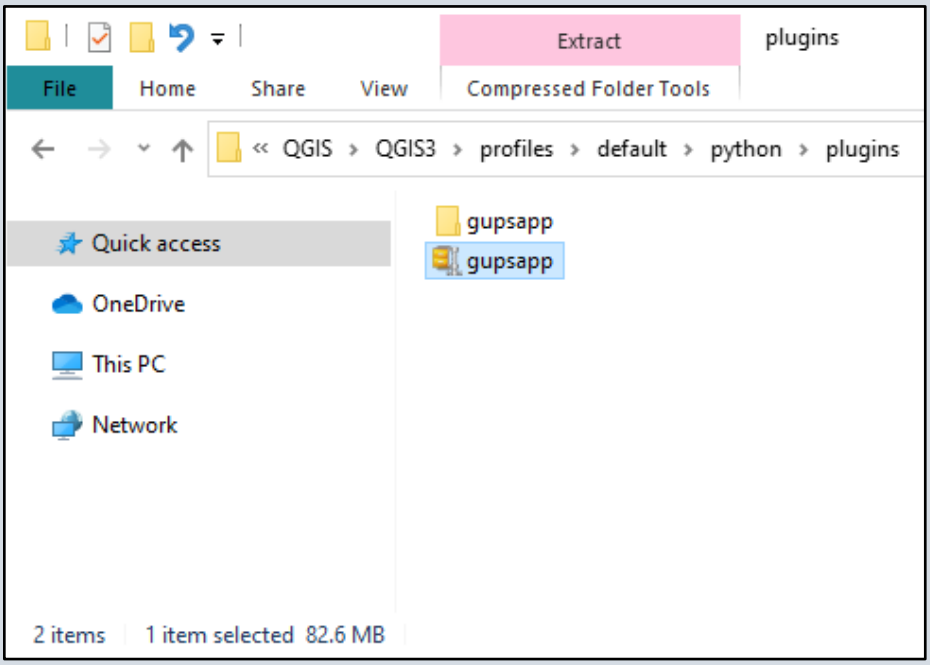
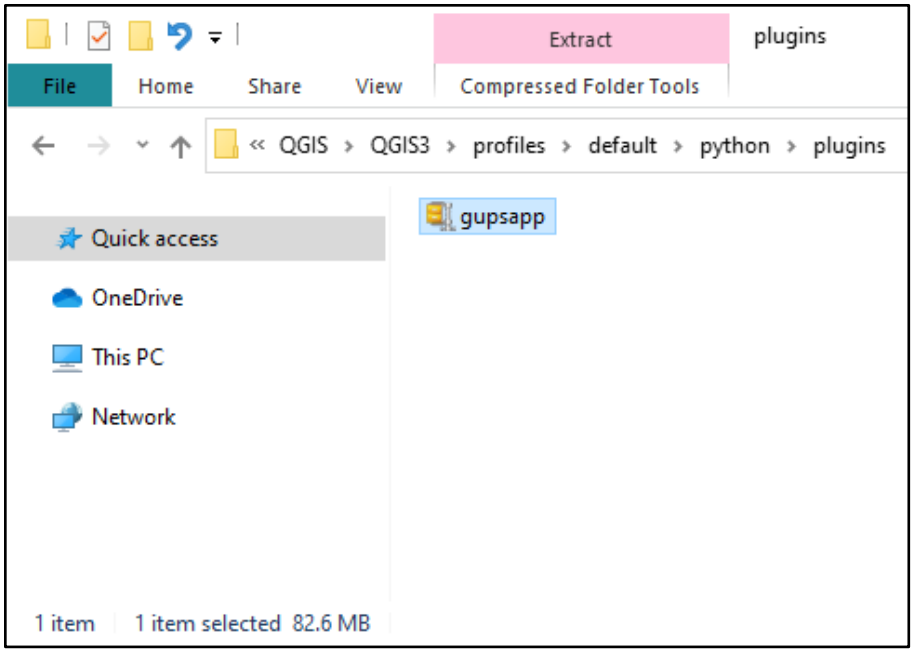
Step	Action and *Result(s)*
Step 1	With QGIS open, identify the GUPS version by accessing the **GUPS → About GUPS** menu located on the **Menu bar**. The Menu bar buttons are described in sub-appendix **C1**. If the version is lower than version 14.0.0-6, navigate to the 2020 PUMA website and download the proper version. Those steps are discussed in **Table 2** and should be applied before proceeding with the details in this table. 
Step 2	If no Map Management window is visible, from the **Menu bar** choose the **Plugins** menu and then **Manage and Install Plugins**. 
Step 3	*The Plugins window opens*. Select the **Installed** option on the left side of the window. Confirm a checkmark exists next to the **gupsapp** item. If a checkmark is absent, use the mouse to select the box to the left of the gupsapp name. Choose the **Close** button to close the window. 

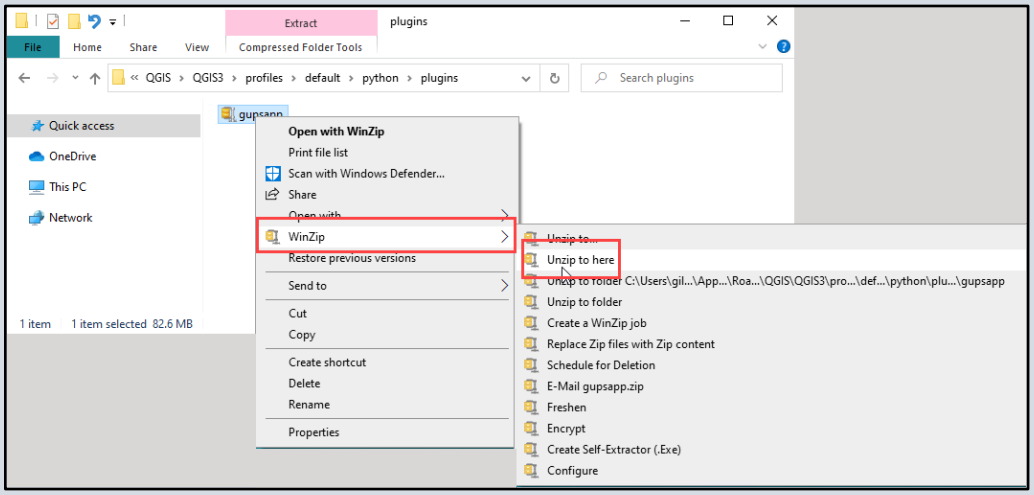
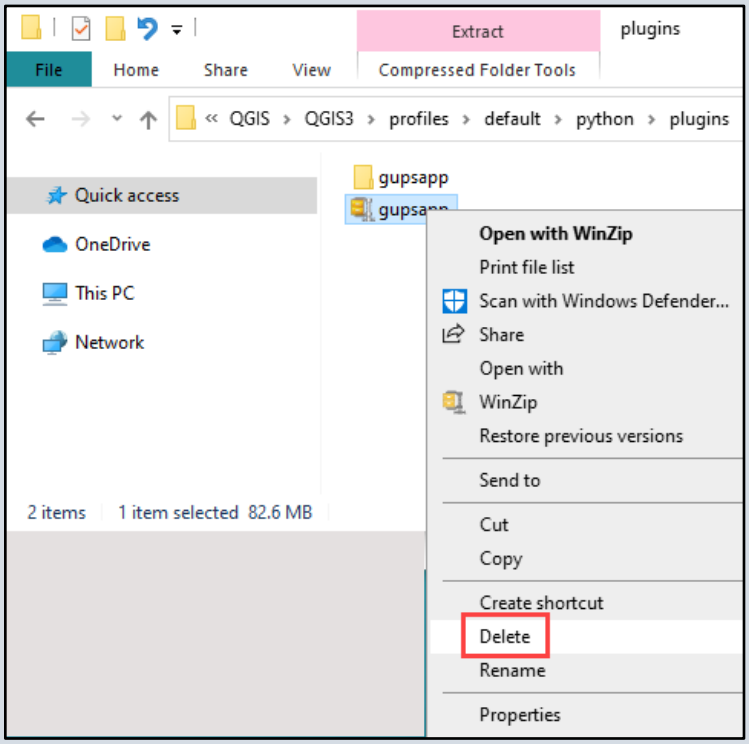
Step	Action and *Result(s)*
Step 4	Close QGIS and restart the software by selecting the **QGIS3** icon from the Start Menu.  If the Map Management window still does not appear, add the plugin manually following the remaining steps in this table.

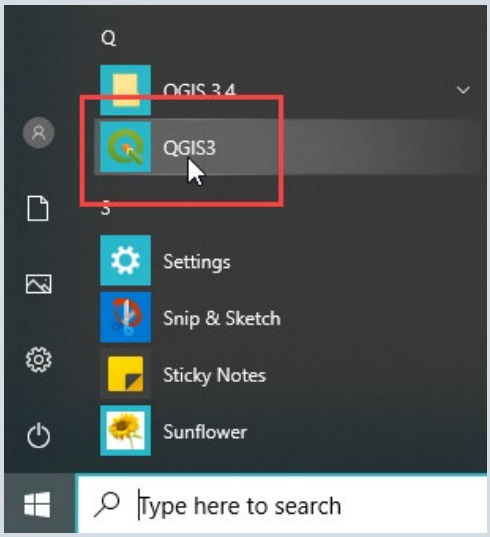
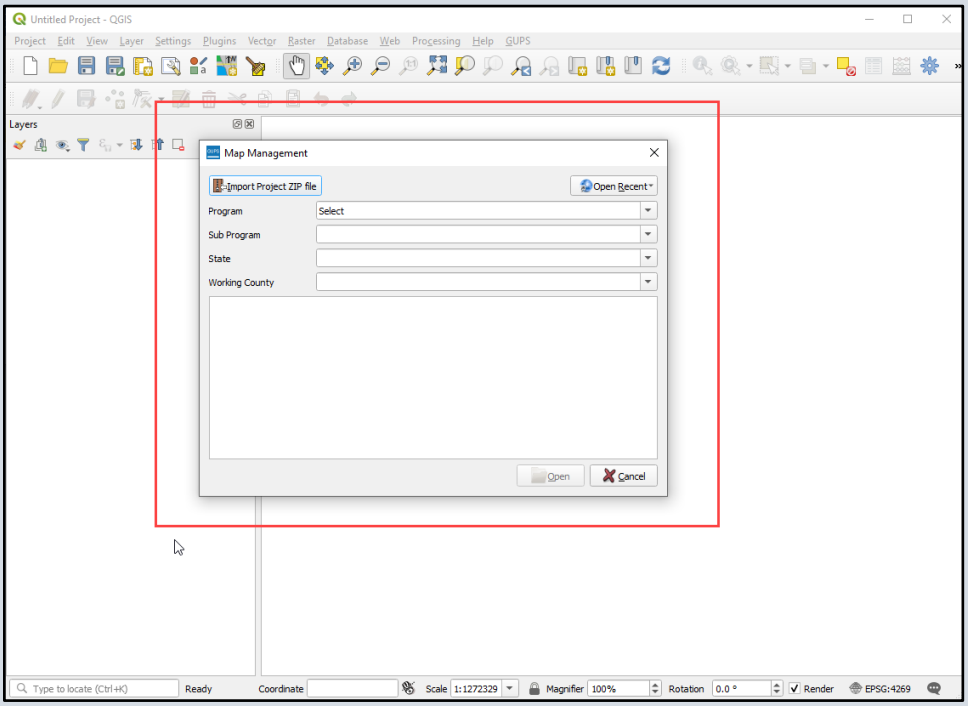
Step	Action and *Result(s)*
Step 5	From the **Menu bar**, select the **Settings→Select User Profiles→Open Active Profile Folder**.  *The default profile window opens*. 
Step 6	Select and open the **python** folder. *The window shows the contents of the **python** folder*. 

Step	Action and *Result(s)*
Step 7	Select and open the **plugins** folder. *The window shows the contents of the **plugins** folder.* 
	Keep this window open. Do not close this window. This window provides the location where upcoming changes are needed.
Step 8	Close QGIS by selecting **Project →Exit QGIS** or by selecting the "X" in the upper right corner. 

Step	Action and *Result(s)*
Step 9	With the plugins window still open, open another File Explorer window on the computer. Navigate to the location where the **gups.zip** file was saved and unzipped. Note, this occurred as part of action described in **Table 2**. 
Step 10	Select and open the **items** folder. 

Step	Action and *Result(s)*
Step 11	Copy the **gupsapp.zip** file from the **items** folder into the **plugins** folder in Step 7. 
Step 12	Delete the **gupsapp** folder so that only the **gupsapp.zip** file exists in the **plugins** folder. 

Step	Action and *Result(s)*
Step 13	Unzip the **gupsapp.zip** file to the **plugins** folder. WinZip provides the **Unzip to here** option that handles the proper placement of unzipped file contents. 
	Unzipping the file elsewhere is incorrect and will cause problems with correcting the installation problem.
Step 14	Once the unzip action completes, confirm the new **gupsapp** folder was created and delete the **gupsapp.zip** file from the **plugins** folder. 

Step	Action and *Result(s)*
	For GUPS to work, the plugins folder must contain only the **gupsapp** folder, as shown in Step 7.
Step 15	Open QGIS by selecting the **QGIS3** icon from the Start Menu.  If the Map Management window appears, the installation issue is resolved. Begin delineating PUMAs for your state. 
Step 16	If the Map Management window does not appear, please contact the Census Bureau by email at <geo.puma@census.gov> for assistance.

With the installation issue corrected, return to **Chapter 3** for instructions on opening GUPS and starting a PUMA project.

APPENDIX C ADDITIONAL GUPS FUNCTIONALITY

The Census Bureau strongly recommends the use of the QGIS documentation to supplement information provided within this appendix. Refer to the QGIS documentation guide on-screen or download an Adobe Acrobat PDF of the QGIS 3.4 documentation from the following link, <Documentation (qgis.org)>.

Note: The QGIS 3.4 documentation is in the "Archived" section at the bottom of the previously listed link.

The content included in the subsequent appendices may vary from what appears with each QGIS/GUPS installation, but we anticipate most installations will include the menus and toolbar elements described within this appendix. If new/different menus, sub-menus, toolbar buttons, etc. appear that are not included in this appendix, check the QGIS documentation.

C1 Menu Bar

The Menu bar includes top-level, drop-down menus and allows navigation through GUPS using a standard hierarchical menu. Most relate to QGIS functionality and not GUPS functionality. The Menu bar, shown in **Figure 12**, offers basic features to manage the Map View. Almost all the functions available from the Menu bar are also available in the various toolbars.

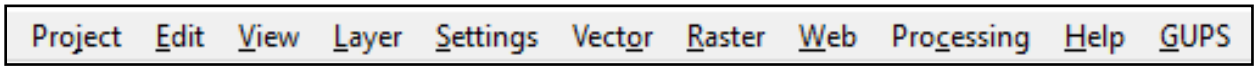
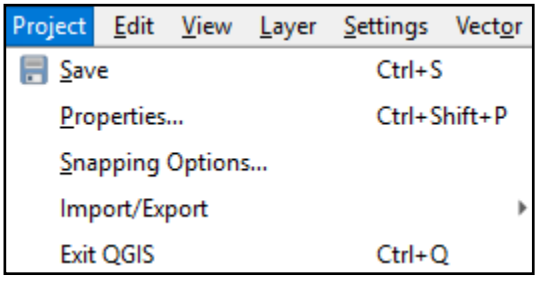
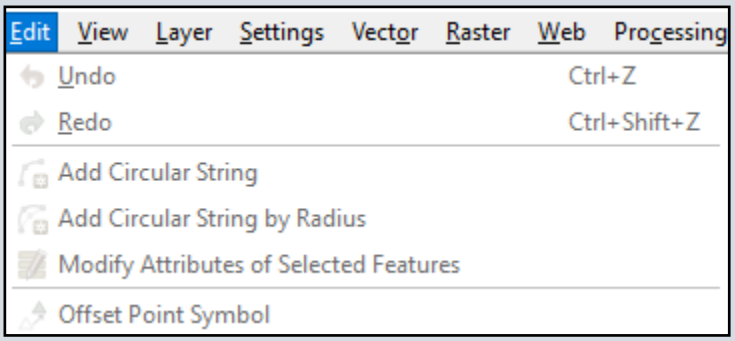
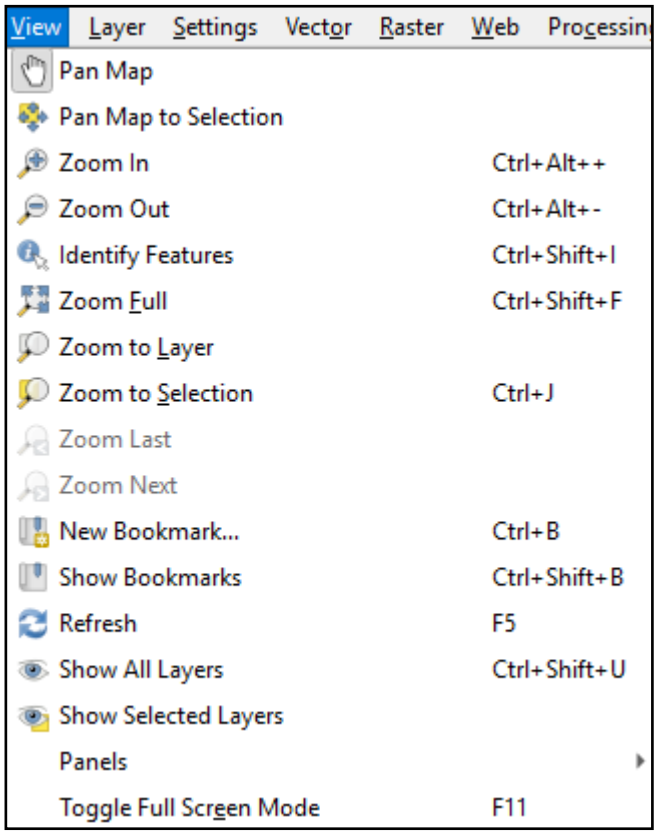
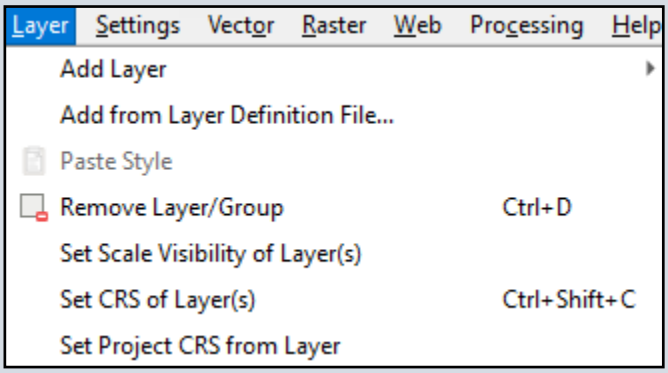


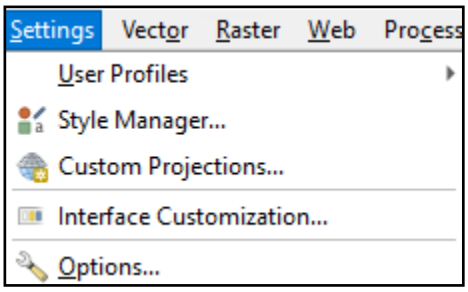
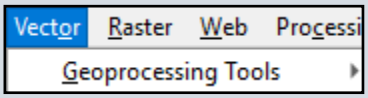
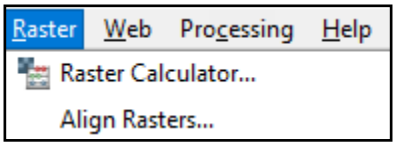
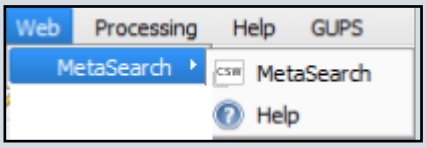
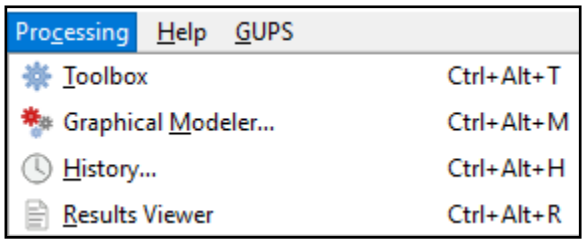
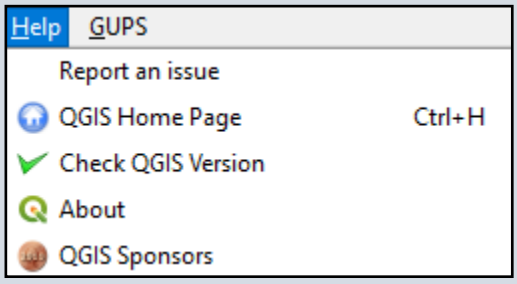
Figure 12: Menu Bar

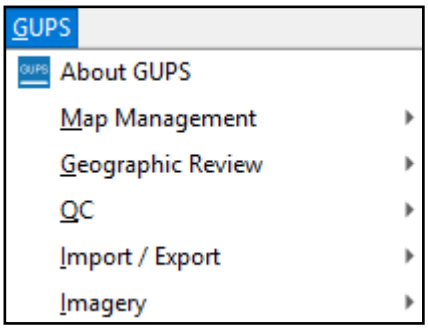
Table 21 provides the function(s)/description(s) of the menus and sub-menus of the Menu bar.

Table 21: Menu Bar Tabs and Their Function/Description

Menu	Menu Option(s)	Function/Description
Project		Provides access and exit points of the project file.

Menu	Menu Option(s)	Function/Description
Edit		Provides most of the native tools to edit layer attributes or geometry. For the Undo and Redo sub-menus to activate, the layer must be active/selected in the Table of Contents.
View		Provides tools to interact with Map View.
Layer		Provides large set of tools to create new data sources, add them to a project, or save modifications to them. The Add Layer sub-menu is useful to add PUMA delineations as reference layer prior to importing into a project.

Menu	Menu Option(s)	Function/Description
Settings		Provides tools and options to manage profiles, styles, projections, and interfaces of the project. Because we ask for no changes to the Map content (so no changes to the projection), this menu is not needed for the 2020 PUMA.
Vector		Provides common vector-based GIS tasks from different providers. Core plugins affect subcomponent availability. Not needed for the 2020 PUMA.
Raster		Provides common raster-based GIS tasks from different providers. Core plugins affect subcomponent availability. Not needed for the 2020 PUMA.
Web		Provides access to tools that are QGIS based. Not needed for the 2020 PUMA.
Processing		Provides tools that pertain to algorithms, models, etc. Not needed for the 2020 PUMA.
Help		Provides common help functions for understanding QGIS.

Menu	Menu Option(s)	Function/Description
GUPS		Provides information about GUPS version (About GUPS) and shortcuts to other common GUPS related toolbars. The About GUPS sub-menu provides the GUPS version number. Callers to technical support need to provide the version number with their question.

Proceed to the next sub-appendix for details on the Standard toolbar.

C2 Standard Toolbar

The Standard toolbar, shown in **Figure 13**, provides navigation tools and other tools needed to interact with the Map View and layers' attribute tables.

Figure 13: Standard Toolbar

The Standard toolbar includes three sub-toolbars, identified by the grouping bars or markers on the toolbar. See **Figure 14** for a visual of the markers.

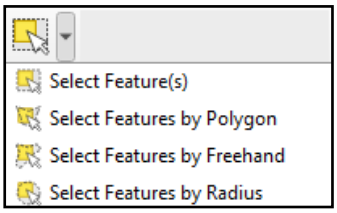
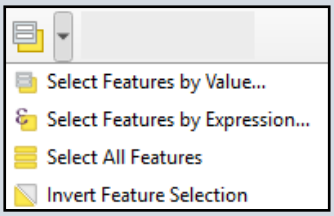
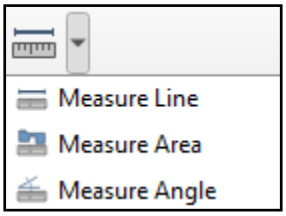
Figure 14: Sub-Toolbar Markers

The first sub-toolbar, the Project toolbar, contains buttons for saving projects, changing map projects, and managing map projects. The second sub-toolbar, the Map Navigation toolbar, contains buttons to navigate the Map View. The last sub-toolbar, the Attributes toolbar, contains buttons to identify, select, and measure elements within the map. To rearrange the toolbars, press the left mouse button and hold the sub-toolbar marker then drag it to the desired location within the project. Release the mouse button to set the toolbar in the new location.

Table 22 provides a visual of each button, the corresponding name, and each button's function/description.

Table 22: Standard Toolbar Buttons and Their Function/Description

Button	Name	Function/Description
	Save	Saves the current GUPS project including changes to the layer properties, last viewed map extent, and layers added.
	Style Manager	Opens window to edit the markers, lines, fills, colors, etc. within a project. Not recommended for use in the 2020 PUMA.
	Map Management	Opens window to choose GUPS program, import a zip file, or open a recent project. Likely will not use once the PUMA project is initially created.
	GUPS Data Settings	Opens window to change the GUPS working directory should problems occur when loading data. Also allows for deletion of a program or a project. Contact the Census Bureau prior to use of this button because deletion of program or project is permanent. For more instructions specific to cleaning a PUMA project refer to **Appendix E**.
	Import Custom Shapefile	Permits user to import their own shapefiles for reference into a project.
	Pan Map	Re-centers Map View based on location selected in the Map View without changing the scale.
	Pan Map to Selection	Re-centers Map View based on selected feature(s) without changing the scale.
	Zoom In	Increases the map scale after selecting the Map View and displays Map View at the larger scale.
	Zoom Out	Decreases the map scale after selecting the Map View and displays Map View at the smaller scale.
	Zoom Full	Displays Map View at the full extent of the project.
	Zoom to Selection	Zooms to the scale of the feature selected in the Map View or in the attribute table.
	Zoom to Layer	Zooms to the extent of layer selected in the Table of Contents.
	Zoom Last	Returns to the previous zoom extent.

Button	Name	Function/Description
	Zoom Next	Moves forward to the next zoom extent.
	New Bookmark	Creates a spatial bookmark for the given area to ease navigation. Allows for the naming and saving of the geographic location for future reference.
	Show Bookmarks	Views and manages spatial bookmarks. Use the mouse to double-click bookmark name in the Spatial Bookmark window to zoom to the bookmark.
	Refresh	Refreshes Map View at the current extent.
	Identify Features	Identifies features in the Map View.
	Select Features by area or single click	Reveals four selection methods: single click, polygon, freehand, and radius. PUMA participants' likely use tools within the PUMA toolbar to select features.
	Select Features by Value	Reveals four selection tactics: by value, by expression, all features, and invert selection. PUMA participants' likely use tools within the PUMA toolbar to select features.
	Deselect Features from All Layers	Deselects selected features from all layers in a single action. Useful to deselect census tracts or counties and begin again during delineation.
	Toolbox	Reveals a Processing Toolbox window with numerous QGIS processing tasks. Not used in the 2020 PUMA.
	Measure	Reveals three measure options to measure the distance along a line, for an area, or for an angle on the map.

Proceed to the next sub-appendix for details on the Table of Contents and its toolbar.

C3 Table of Contents and TOC Toolbar

Though the Census Bureau believes the default organization of layers and symbology serves PUMA participants in the most efficient manner, participants may use the Table of Contents and Table of Contents toolbar to manage the Map View. See **Figure 15** for a visual of the Table of Contents toolbar.

Using the Table of Contents toolbar, participants can add and remove layers or groups, manage map themes, filter the legend by map content or by expression, expand or collapse all sections of the Table of Contents list at once and may remove layers/groups. Participants may manipulate layers and symbology in GUPS using basic selection/deselection techniques in the Table of Contents, like with other GIS software. Manipulation of layers within the Table of Contents may assist with viewing information more appropriately in the Map View. Changes made in the Table of Contents reflect immediately in the Map View.

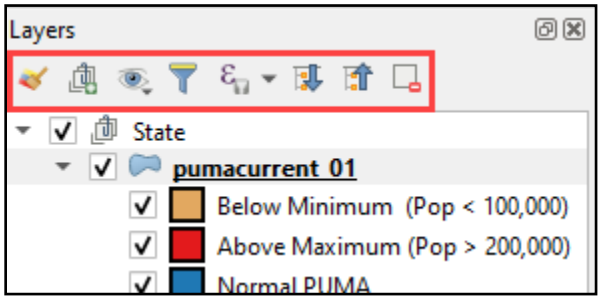


Figure 15: Table of Contents Toolbar

Table 23 provides a visual of each button, the corresponding name, and each button's function/description.

Table 23: Table of Contents Toolbar Buttons and Their Function/Description

Button	Name	Function/Description
	Open Layer Styling Panel	Toggles layer styling panel on/off.
	Add Group	Organizes layers in the Table of Contents into groups.
	Manage Map Themes	Offers modification of views based on layers in the Table of Contents.
	Filter Legend by Map Content	Removes layers not currently in the Map View extent.
	Filter Legend by Expression	Removes features from the selected layer tree style that have no features satisfying a condition/expression.
	Expand All	Expands the Table of Contents menus to display all layers under each group's menu.
	Collapse All	Collapses the Table of Contents menus to only show groups (not the layers beneath).
	Remove Layer/Group	Removes a layer or group from the Table of Contents.

To manage visibility of individual groups or layers, check the checkbox next to a layer to make the layer visible (e.g., turn the layer on) in the Map View. Uncheck the checkbox (e.g., turn the layer off) next to a layer to make the layer invisible in the Map View. This may prove beneficial if the Map View is cluttered with too many data layers.

To expand the menu for a layer or grouped layer, select the ▸ symbol and the sub-menu opens. Select the ▾ symbol to collapse the sub-menu. See **Figure 16** for an example of the checkmark and arrow symbology.

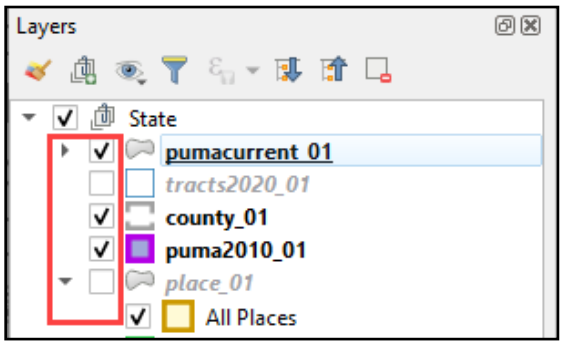


Figure 16: Table of Contents with Layer Checkmarks and Arrows

The order in which the layers appear in the Table of Contents determines the order that the layers display in the Map View. The layers at the top of the Table of Contents display on top of the layers that appear below them. While PUMA GUPS is programmed to display data layers in an order that works for most participants, adding imagery or other data layers may require a reordering of layers for the map elements to appear properly within GUPS. To manage the order of layers, use the mouse and follow these steps:

1. Select the layer name in the Table of Contents.
2. Hold down the mouse button and drag the layer to the desired position in the Table of Contents.
3. Release the mouse button to place the layer in its new position. The Map View will reflect the new layer order in the Table of Contents.

IMPORTANT: Map labels appear at varying scales dependent on the map layer. For instance, census tract labels appear at the 1:20,000 scale, while minor civil division and incorporated place labels appear at 1:250,000 scale.

Proceed to the next sub-appendix for details on the Status bar.

C4 Status Bar

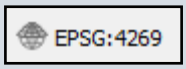
The Status bar, shown in **Figure 17**, provides details on the coordinates, scale, magnification, rotation, and projection. These tools allow users to adjust the display. Also included are an icon to review the software logs and a tool for rendering. Neither of which are used very often during delineation.

Figure 17: Status Bar

Table 24 shows the elements within the Status bar and describes their function(s).

Table 24: Status Bar Elements and Their Function/Description

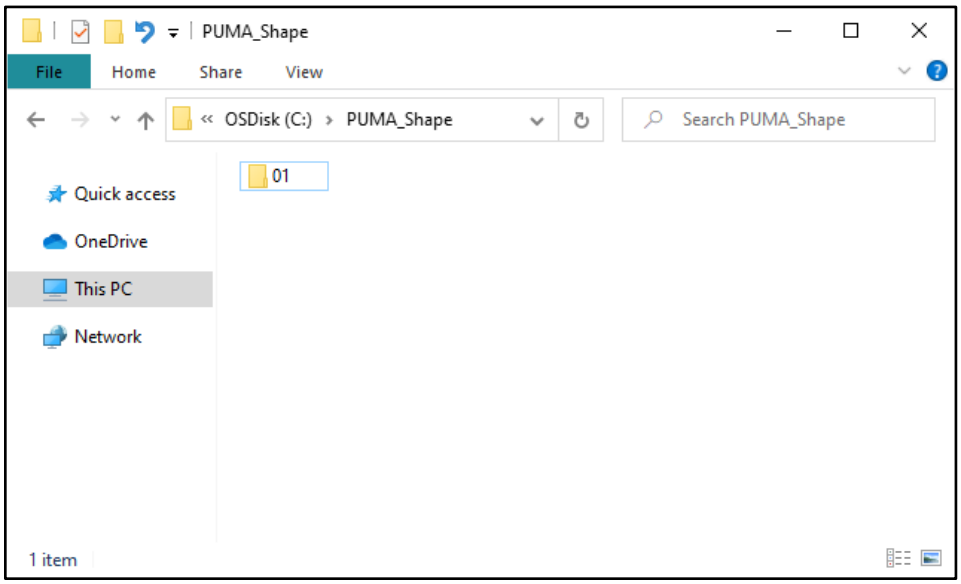
Element	Function/Description
	This locator bar, a quick search widget, helps find and run any feature or option in QGIS.
Coordinate	Shows the current position in map coordinates as the mouse moves across the Map View. The default unit shown is decimal degrees. As a reminder, do not change the projection of the project.
	Toggles between the coordinate position of the mouse cursor or the Map View extents as the map is panned and zoomed.
	Locks the scale to use the magnifier to zoom in and out at the locked scale.

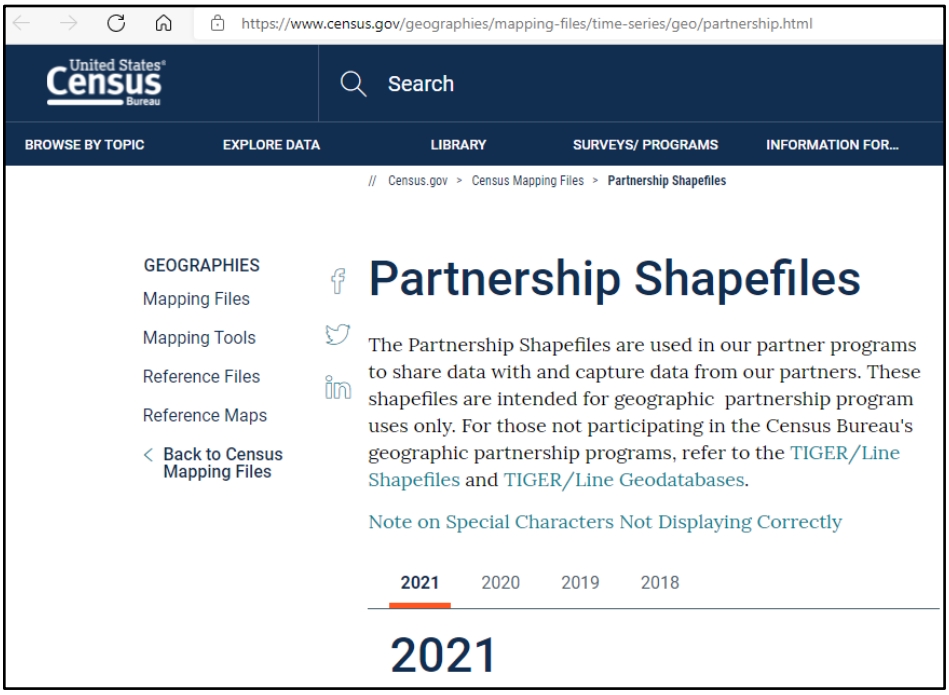
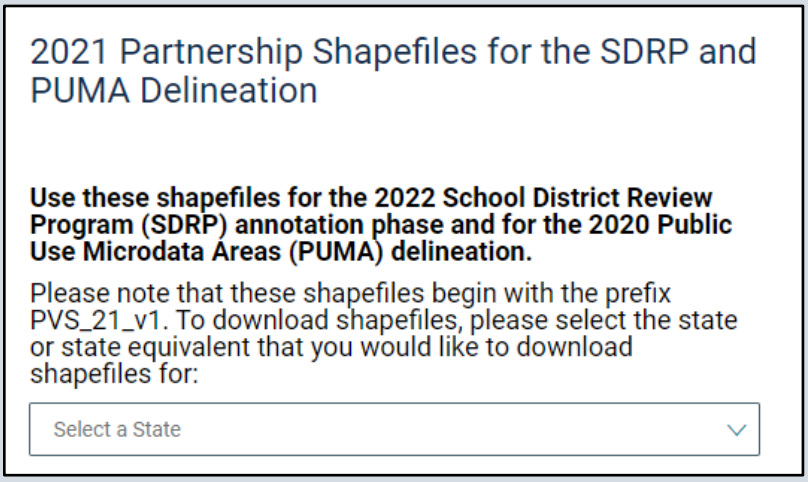
Element	Function/Description
Magnifier	Allows user to zoom without changing the scale in the Map View, making it easier to tweak label positions and symbols. Magnification is as percentage. If 100%, then magnification is not applied to the view.
Rotation	Defines the clockwise rotation for Map View in degrees.
Render	Checkbox to handle the rendering of layers to the Map View.
	Shows the current coordinate reference system used in the Map View.
	Shows the logs for the GUPS session.

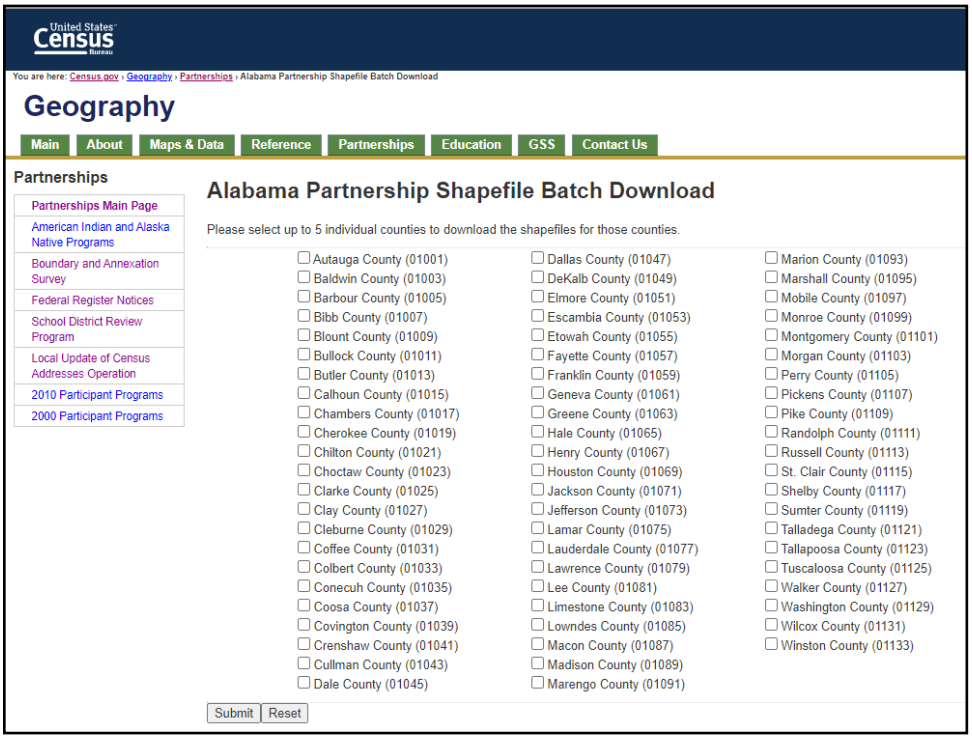
APPENDIX D START A PUMA PROJECT USING MY COMPUTER

While not the preferred option, participants with unstable internet connectivity or restrictions placed on their local network may download the shapefiles to their local machine/network rather than using the Census Web option. To use files from a local computer, the first steps involve downloading and unzipping the proper partnership shapefiles. Follow the steps outlined in **Table 25** for instructions on acquiring and staging the shapefiles needed for the 2020 PUMA.

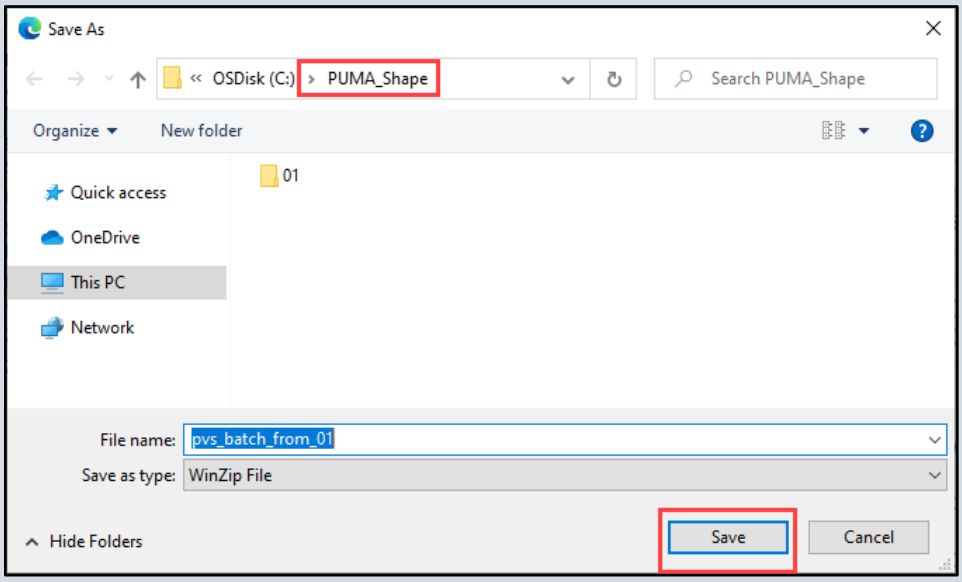
Table 25: Steps to Download and Unzip the 2021 Partnership Shapefiles

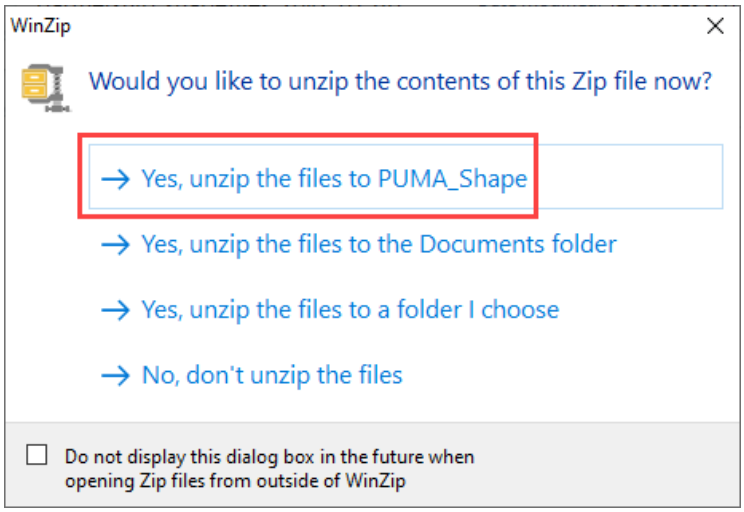
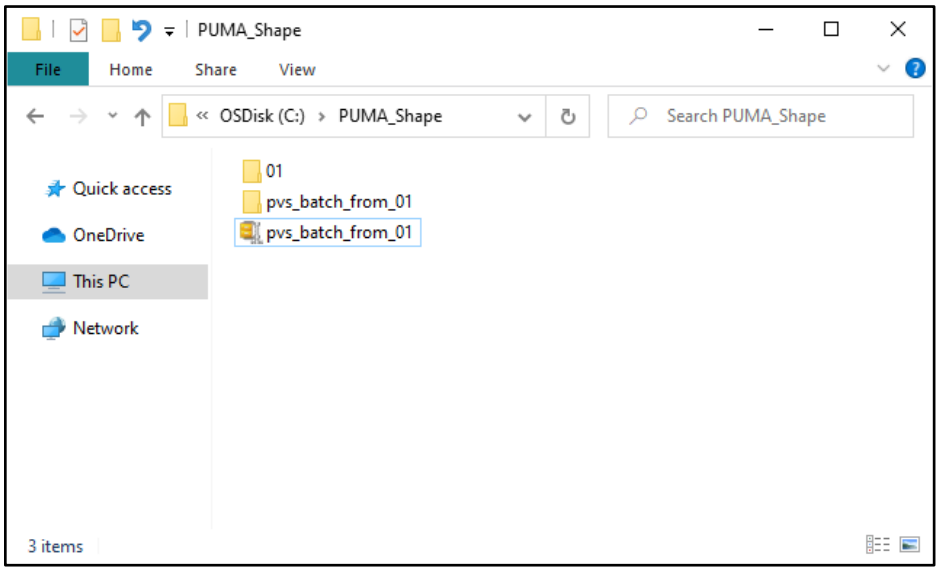
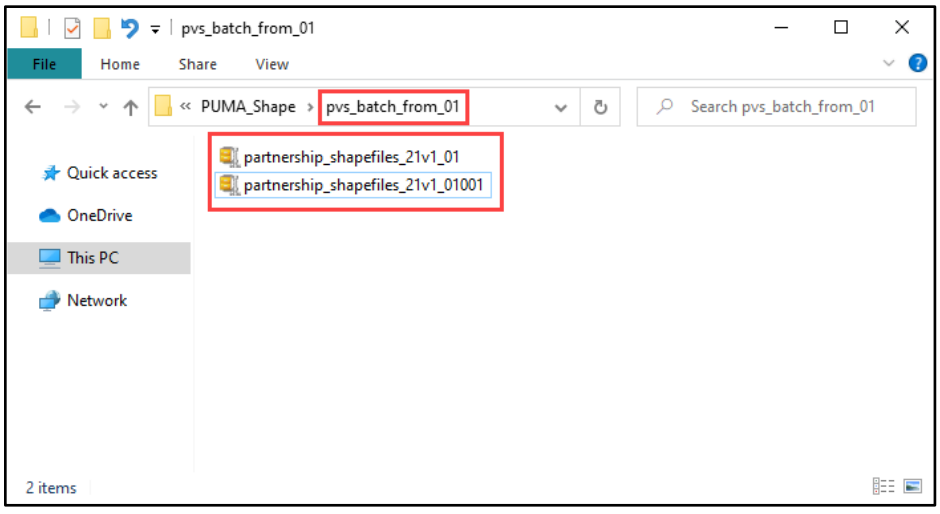
Step	Action and *Result(s)*
Step 1	Create a directory on the local computer or network named **PUMA_Shape** or something similar. Within the **PUMA_Shape** directory, create a sub-directory for the state using its two-digit state FIPS code. This example uses **01** for the state of Alabama. 
	The Census Bureau does not recommend including “GUPS” in the folder’s name to clearly separate locally downloaded shapefiles from GUPS related information.

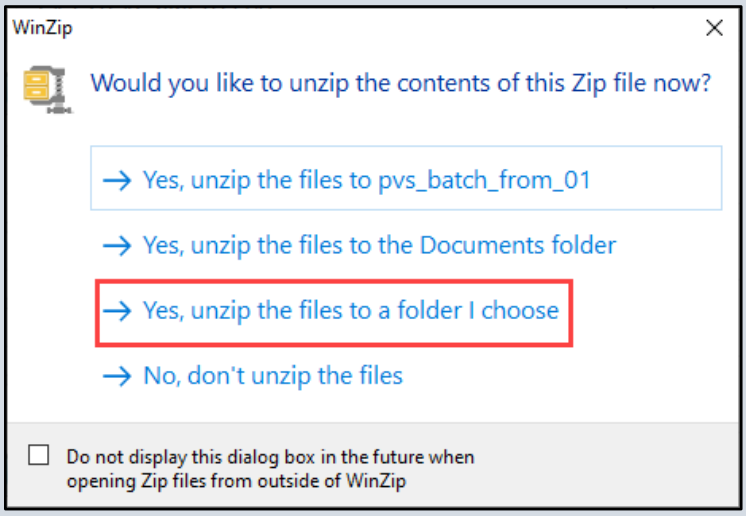
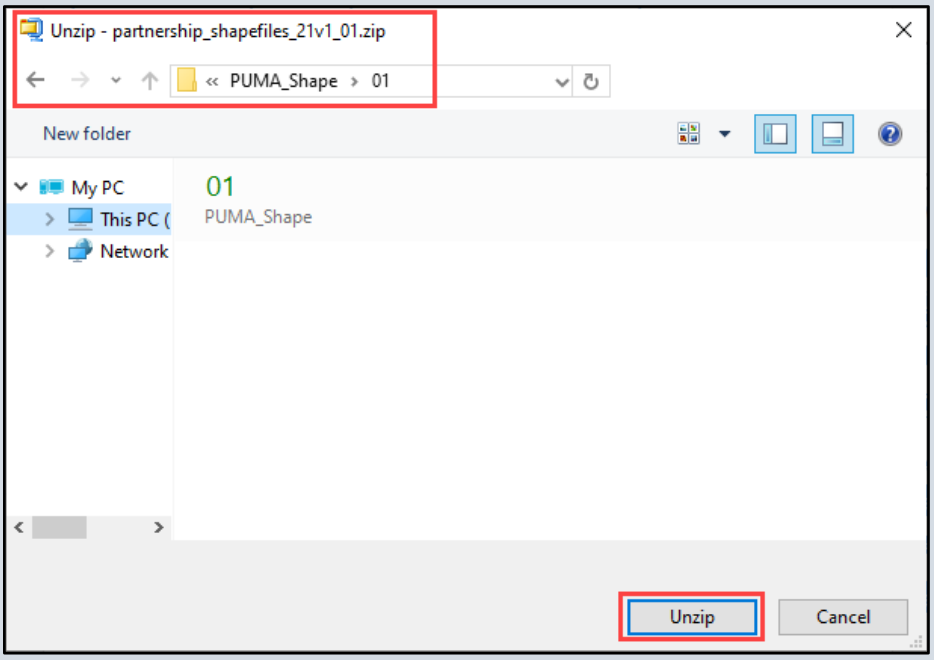
Step	Action and *Result(s)*
Step 2	Navigate to the 2020 PUMA website, scroll down to select **Download Partnership Shapefiles**. *The main Partnership Shapefiles website opens in a separate window.* 
Step 3	Ensure the use of the **2021 Partnership Shapefiles for the SDRP and PUMA Delineation** vintage. Within this section of the page, use the **Select a State** drop-down menu to select the state to download. 

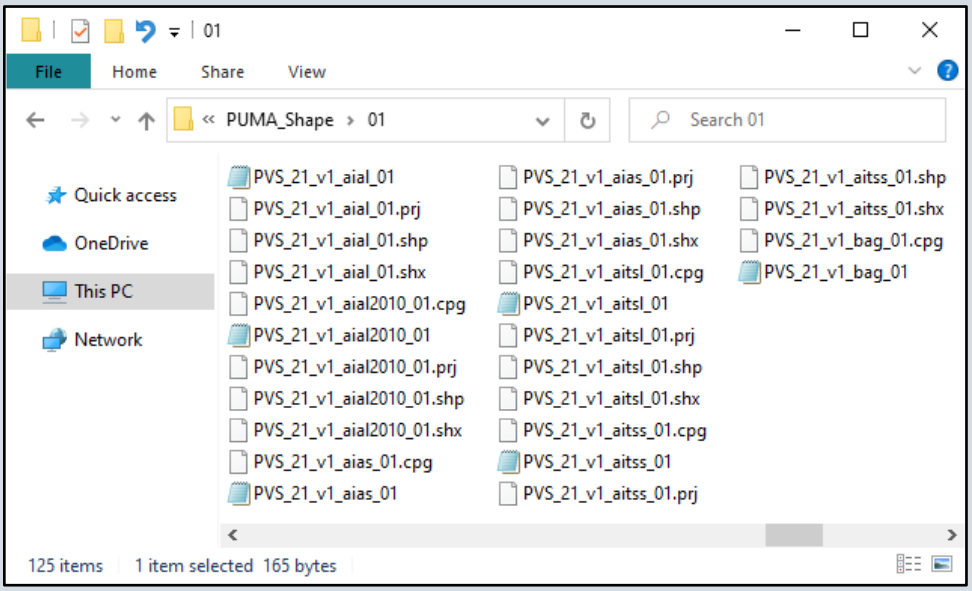
Step	Action and *Result(s)*
Step 4	*The state's partnership shapefile batch download window appears with all the counties within the selected state shown.* 

Step	Action and *Result(s)*
Step 5	Participants may choose a maximum of five counties from the list and select **Submit**. Select **Reset** to clear the selection and begin again.  If the participant intends to use reference layers to assist with delineation and is unable to use the Census Web option for loading reference layers, then this is the mechanism for downloading the individual county shapefiles used for that process. Create a sub-directory for the county in PUMA_Shape (e.g., 01001) before proceeding. This is not illustrated in this table/example.
	To download all the necessary state level files for the 2020 PUMA, a participant only needs to select one county from the list. This action downloads the data for that selected county as well as all the state level files. If the participant does not need the county level data, they can choose a single, small county to download to shorten the download time and reduce the .zip file size.

Step	Action and *Result(s)*
Step 6	*The selected county and state files are bundled into one .zip file for saving locally*. The file is **pvs_batch_from_xx.zip**, where xx is the two-digit state FIPS code. Use the local system's process for saving the .zip file to the previously created **PUMA_Shape** directory. 

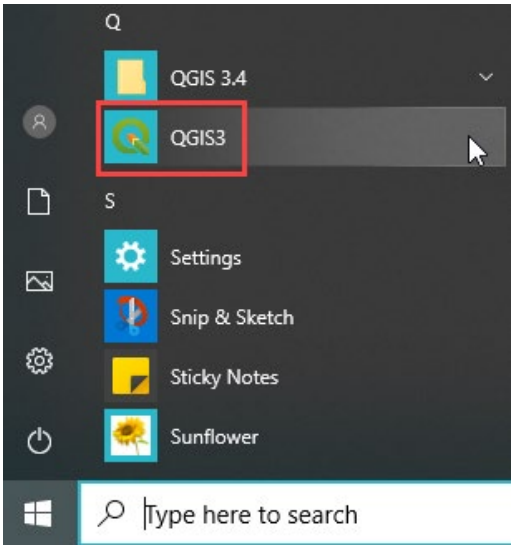
Step 7	Unzip the **pvs_batch_from_xx.zip** file to the same **PUMA_Shape** directory.   *The unzip process creates another sub-directory (pvs_batch_from_01) which contains the additional .zip files for the state and county(s) selected in Step 6.* 

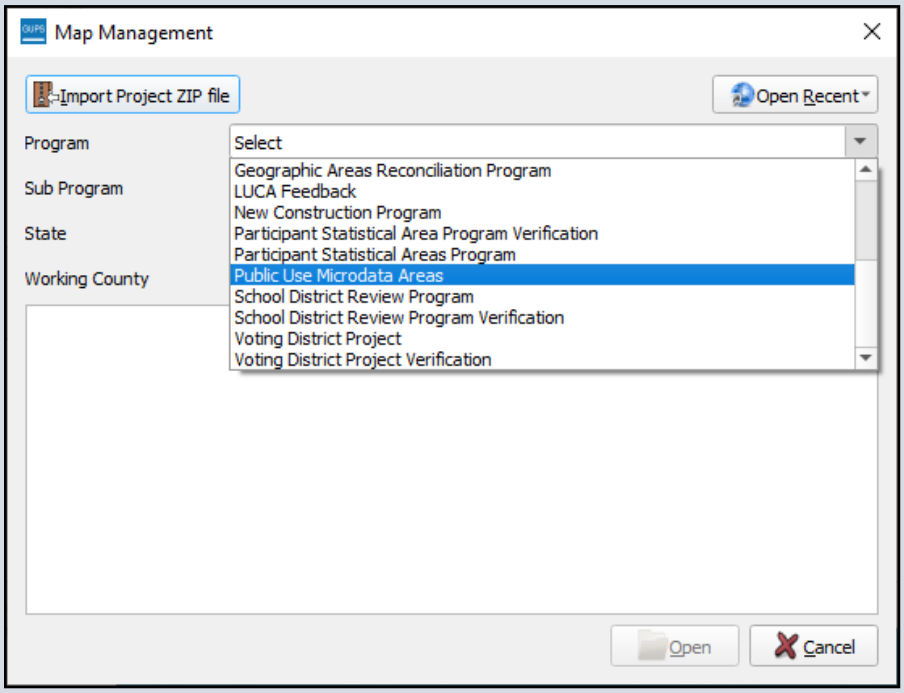
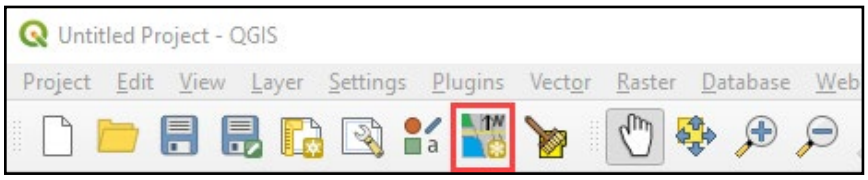
Step	Action and *Result(s)*
Step 8	Unzip the state-level zip file (i.e., partnership_shapefiles_21v1_01.zip) to the state sub-directory (01) created in Step 1. For WinZip, choose the third option, "Yes, unzip the files to a folder I choose" to select this state sub-directory.  
	To unzip the county-level .zip file, create a county level sub-directory in Step 1 and follow the same process. If the county level shapefiles are not needed, unzip only the .zip file that ends with the state FIPS code.

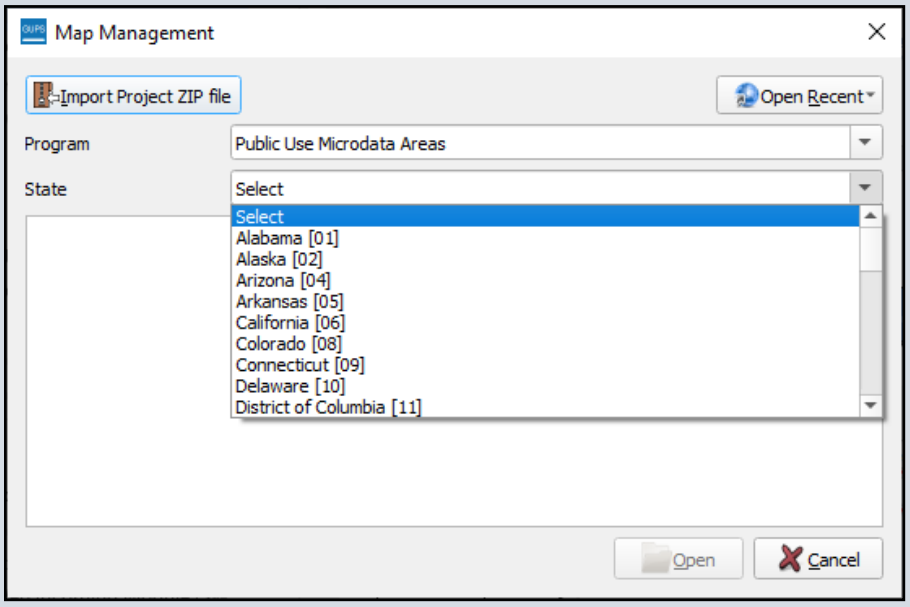
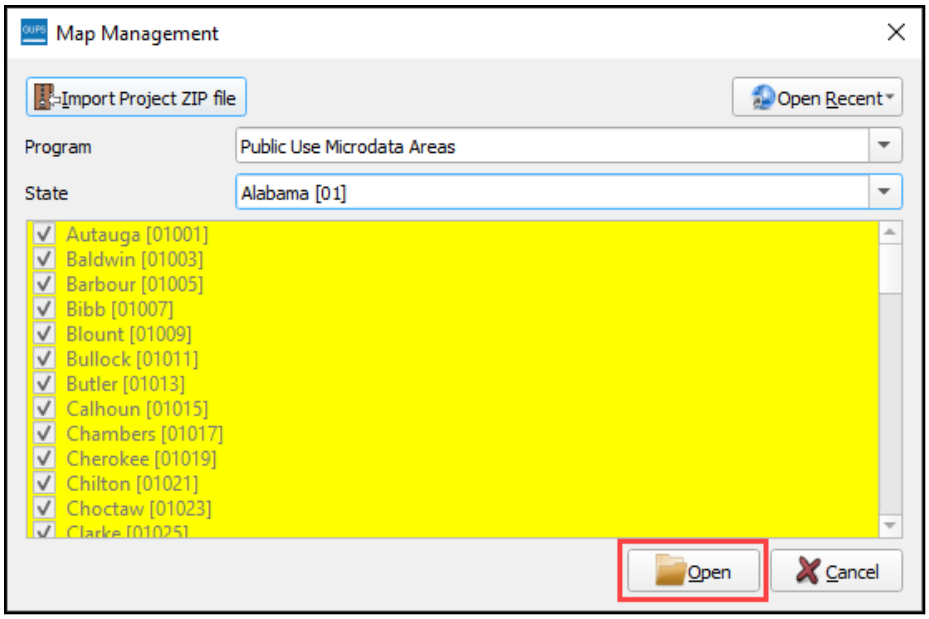
Step	Action and *Result(s)*
Step 9	*Once unzipped, the state sub-directory contains the shapefile components.* Confirm the sub-directory contains shapefiles that begin with "PVS_21_v1". This is the version required by 2020 PUMA. This image does not depict all the shapefiles in the folder. 
	Participants using the "My Computer" option rather than "Census Web" **must** save the 2021 Partnership shapefiles as described in this table. GUPS requires one sub-directory with the state shapefiles (named by the state FIPS code) to operate properly.

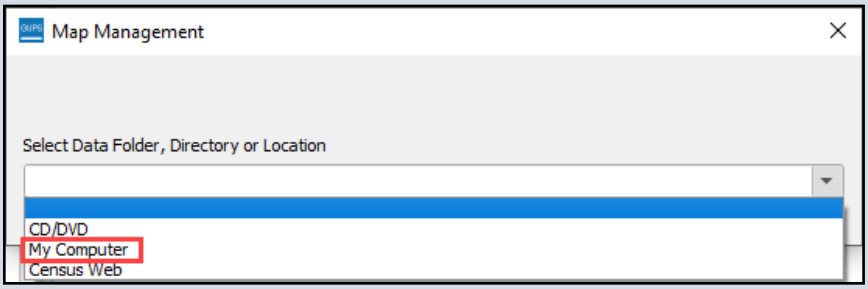
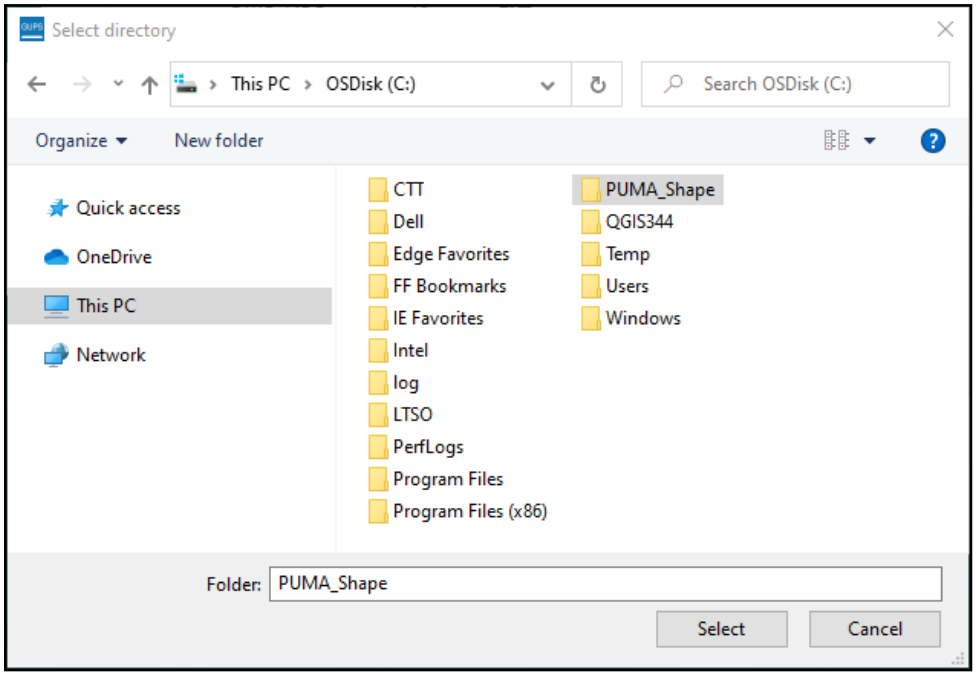
With the shapefiles downloaded and unzipped, proceed to **Table 26** for instructions to open GUPS and start a project using the My Computer option.

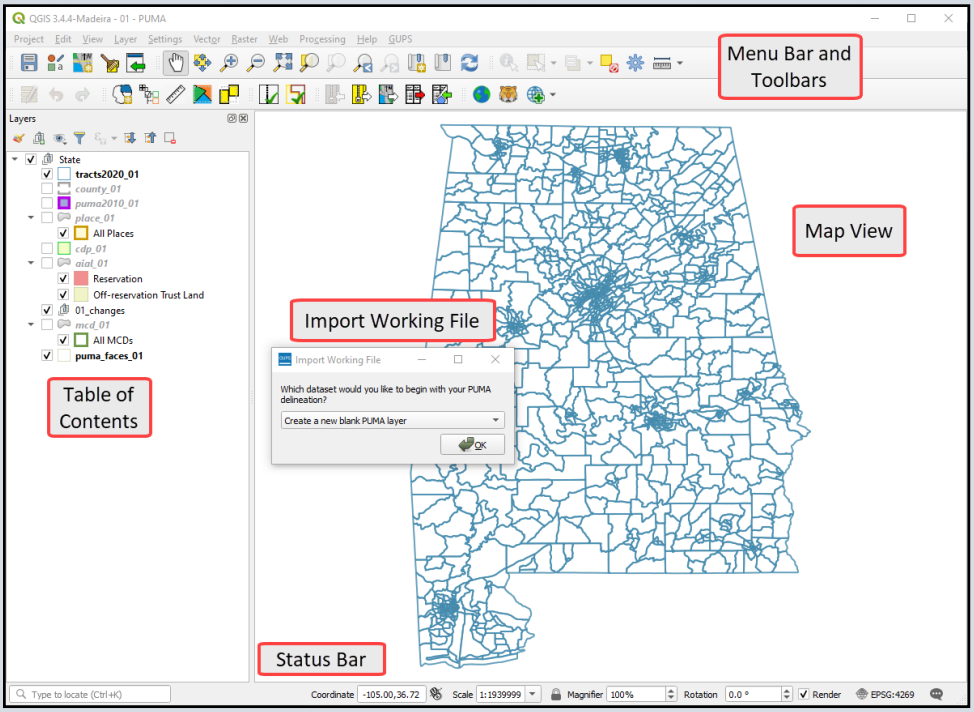
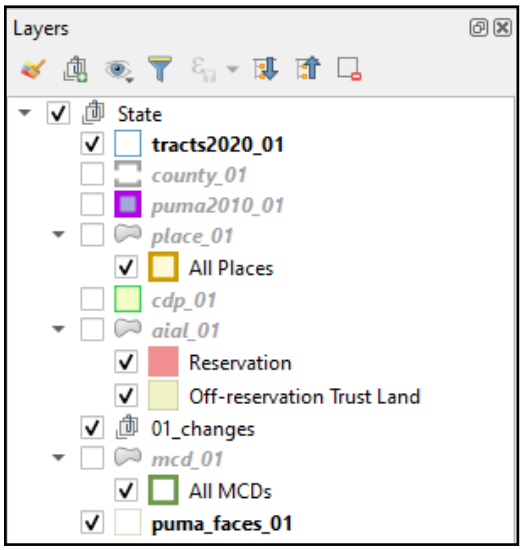
Table 26: Steps to Open GUPS and Start a PUMA Project Using My Computer

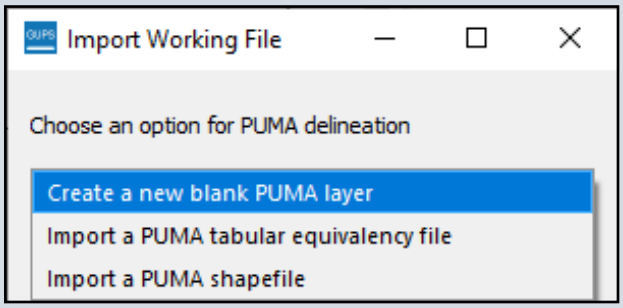
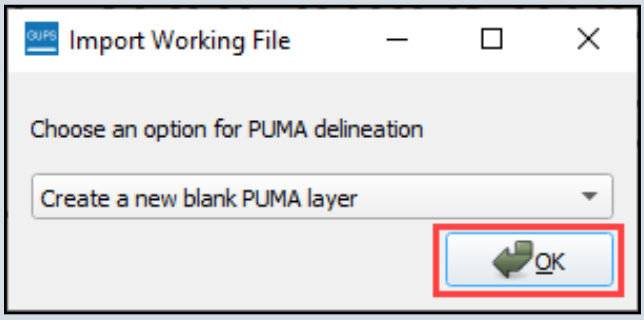
Step	Action and *Result(s)*
Step 1	To open GUPS, select the **QGIS3** icon from the Start Menu.  *The QGIS splash screen appears*. Depending on the age of the computer and amount of RAM, the application may require a few moments to load and open. 

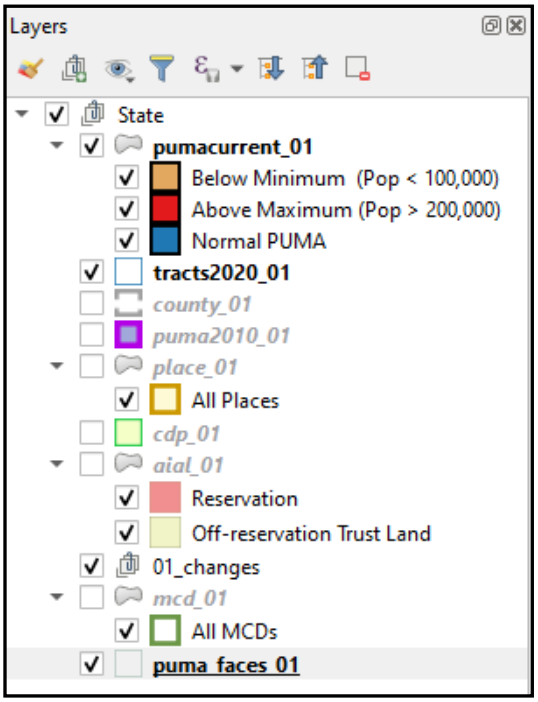
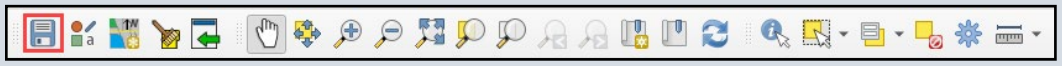
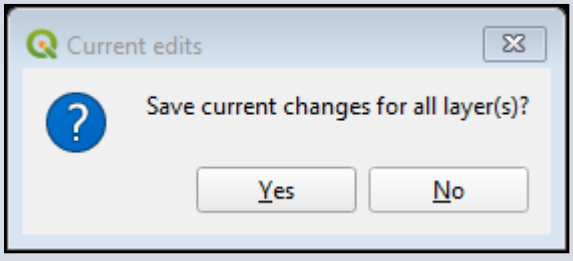
Step	Action and *Result(s)*
Step 2	*The **Map Management** window appears.*  Use the drop-down menu next to the **Program** field to select **Public Use Microdata Areas**.
	If the Map Management window does not appear, choose the Map Management button from the Standard toolbar (shown below highlighted by a red rectangle). If it still does not appear, refer to **Appendix B** for troubleshooting tips. 

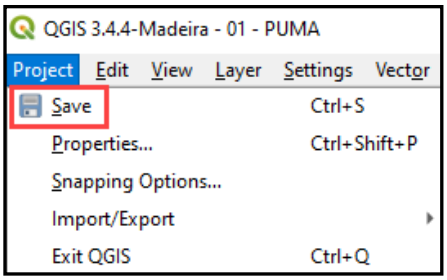
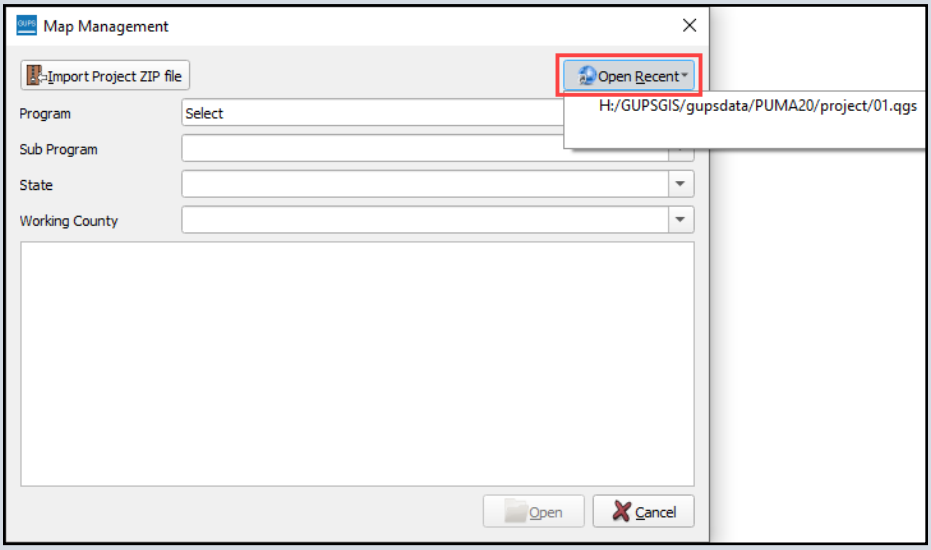
Step	Action and *Result(s)*
Step 3	Choose the state from the list beneath the **State** field. 
Step 4	With the state selected, choose the **Open** button.  *All counties appear in the window below the state name and are selected for opening.*

Step	Action and *Result(s)*
Step 5	From the **Map Management** window, choose **My Computer** from the **Select Data Folder, Directory or Location** menu. 
Step 6	Navigate to the folder where the unzipped shapefiles are located as shown in Step 1 of **Table 25** (e.g., **PUMA_Shape**) to select it. Choose **Select**. 

Step	Action and *Result(s)*
Step 7	After the data loads into GUPS, *the **Table of Contents** populates and symbolizes according to preset styles. The **Map View** displays the counties for the selected state. The **Menu Bar and Toolbars** appear along the top and the **Status Bar** appears at the bottom of the screen. The **Import Working File** window awaits selection for how to begin PUMA delineation*. Refer to sub-chapter **3.1** for high-level information on the main page elements and the default layout.  *The **QGIS 3.4.4 Madeira** and **PUMA** display at the very top left of the application window, along with the two-digit FIPS code of the state*. This information helps a participant confirm use of the newer QGIS version and selection of the correct state and program.
	Basic data layers are loaded into the Table of Contents as shown below before choosing how to begin delineation. They are shown below. 

Step	Action and *Result(s)*
Step 8	Participants choose how to begin their delineation work from one of three options in the **Import Working File** window: **Create a new blank PUMA layer**, **Import a PUMA tabular equivalency file**, or **Import a PUMA shapefile**. Use of each option is detailed in Chapter 4.  Choose an option and the **OK** button to proceed. 

Step	Action and *Result(s)*
	After the delineation option is chosen, *the **Table of Contents** updates to include additional data layers for delineation*. In this case, the "**pumacurrent_01**" data layer is added since the **Create a new blank PUMA layer** option was selected.  The symbolization of the "pumacurrent" layer is vital to understanding the acceptable delineations in the Map View. PUMA delineations that fall below the minimum threshold appear in gold/tan while those that fall above the threshold are symbolized with red. Use of color brings a visual aid to the delineation process.
Step 9	To save a project, use the **Save Project** button on the **Standard toolbar**. Otherwise, delineation work will be lost.  *The **Current edits** confirmation dialog box appears*. Choose the **Yes** button to save or the **No** button to cancel without saving the project. 

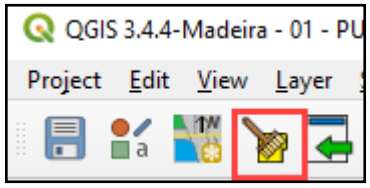
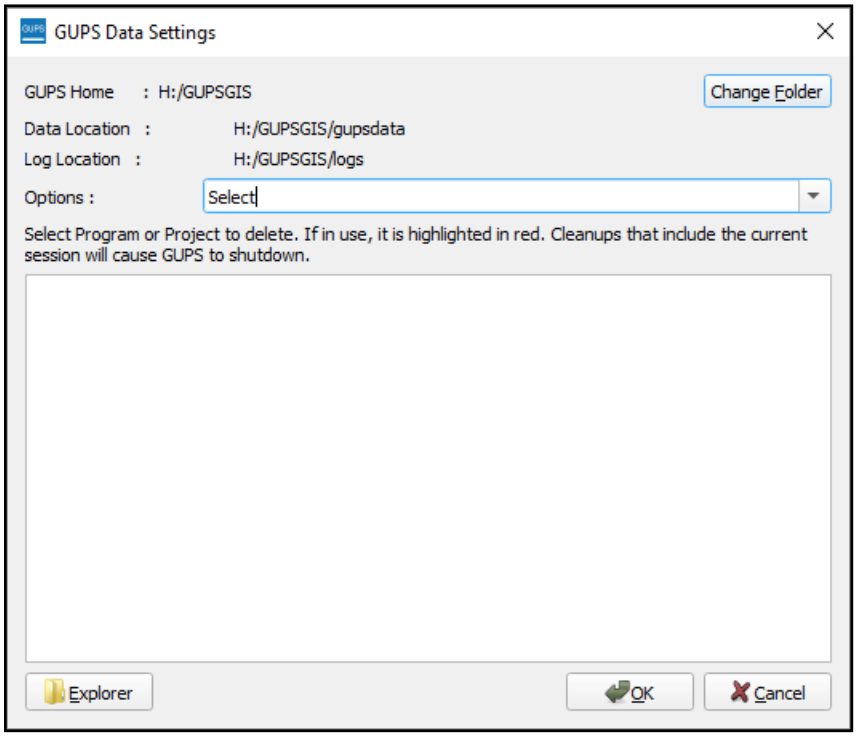
Step	Action and *Result(s)*
	Participants may also use the **Save** option beneath the **Project** tab on the **Menu bar** to save the project. 
Step 10	To reopen a saved project, expand the menu beneath the **Open Recent** button in the **Map Management** window. *The drop-down list provides a list of current projects created using GUPS.* 

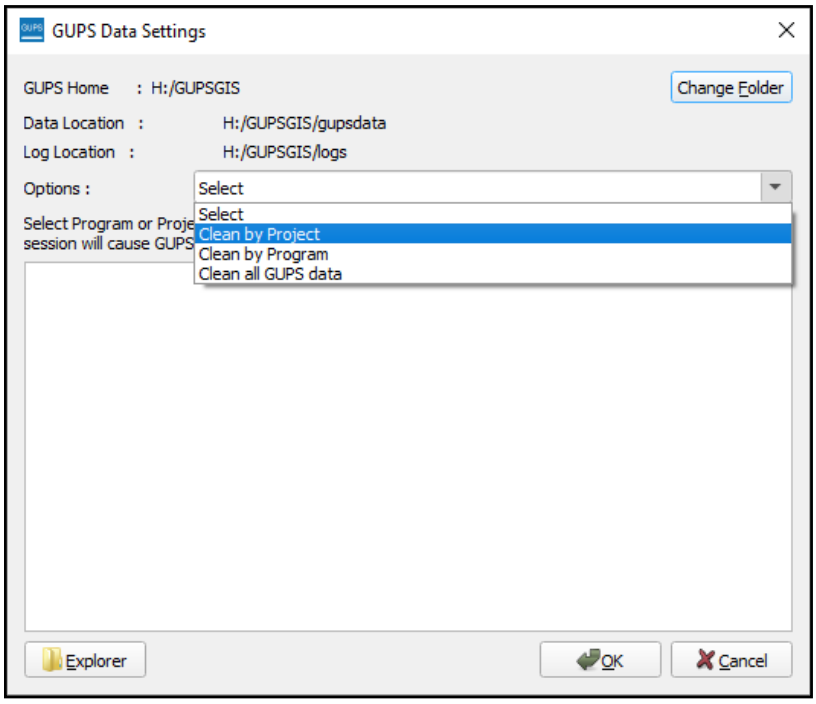
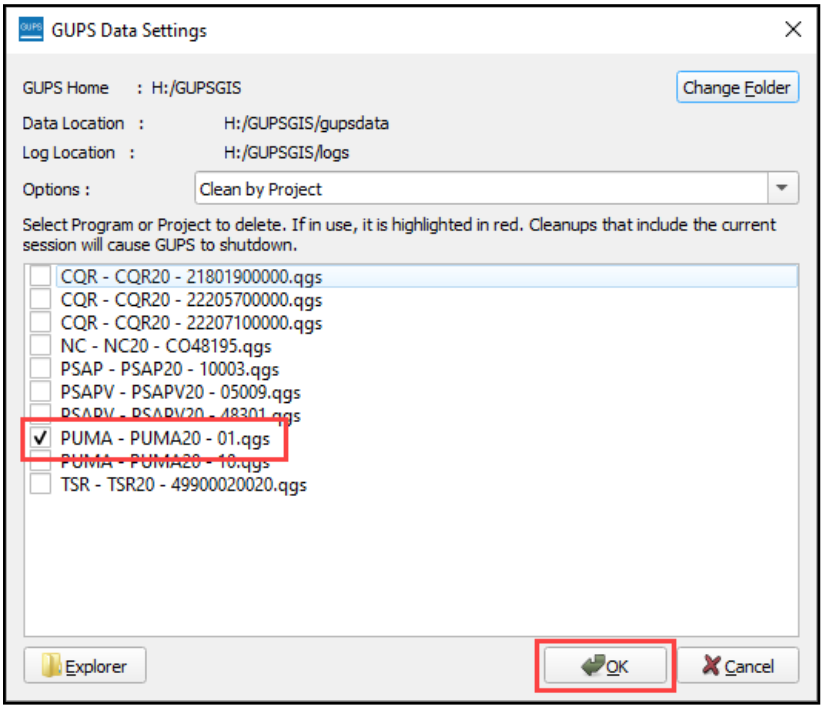
Return to sub-chapter **3.1** to complete the introduction of the GUPS menus and toolbars before proceeding with PUMA delineation as detailed in **Chapter 4**.

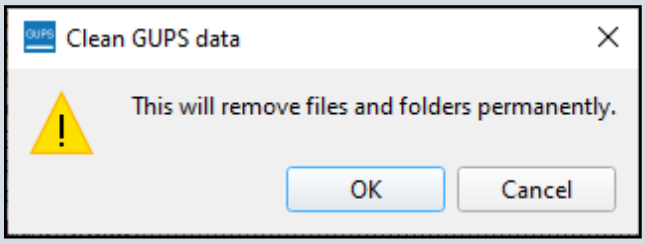
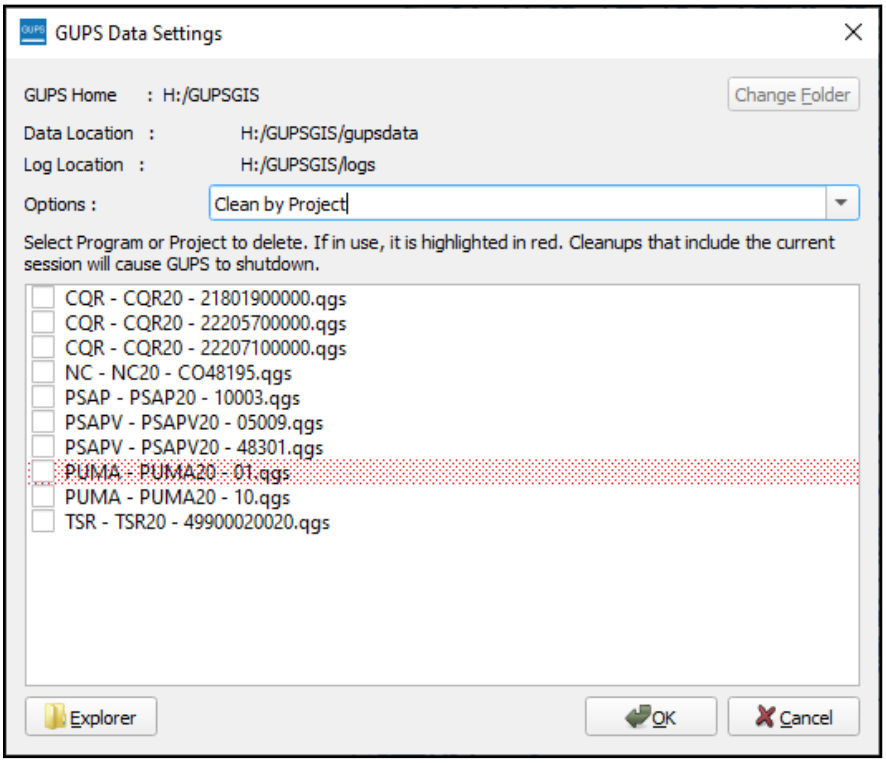
APPENDIX E DELETE (CLEAN) A PUMA PROJECT

To ensure a successful import of a shared PUMA project or to completely delete a problematic project, participants use the Clean button from the Standard toolbar to erase an existing PUMA project and the sub-folders associated with the data in the project. Follow the steps in **Table 27** for instructions on this process.

Table 27: Steps to Delete (Clean) a PUMA Project

Step	Action and *Result(s)*
Step 1	With GUPS launched, but no PUMA project open, select the **Clean** button from the **Standard toolbar**.  *A **GUPS Data Settings** window appears.* 
	A participant uses this same button/window to change the GUPS working directory (e.g., GUPS Home) location. This graphic uses the H:/GUPSGIS.

Step	Action and *Result(s)*
	Select **Clean by Project** from **Options** section of the **GUPS Data Settings** window. 
Step 2	*A list of projects saved on in the GUPS data directory appear*. Select the project to delete from the list that appears and choose **OK** to proceed or **Cancel** to return to QGIS. 

Step	Action and *Result(s)*
Step 3	*A **Clean GUPS data** warning window appears that informs the participant of the permanent nature of this action*. Select **OK** to proceed with the deletion or **Cancel** to return to the **GUPS Data Settings** window. 
	An opened PUMA project will appear with a red shading from the list of program/project to delete.  If the opened project is selected for deletion, QGIS will offer the **Clean GUPS data** warning message and then close automatically and delete the project if **OK** is selected.

Participants may now proceed with PUMA delineation, described in various options throughout **Chapter 4**.